A REVIEW OF THE BLENNOID FISHES OF JAPAN.

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In the present paper is given a descriptive catalogue of the blenny-like fishes (*Blenniidæ* and *Anarhichadidæ*) known to inhabit the waters of Japan. It is based on the collections made by the writers in the summer of 1900 for the museum of Stanford University and on the specimens in the United States National Museum. The accompanying drawings are the work of Mrs. Chloe Leslie Starks and Capt. Charles Bradley Hudson.

Family I. BLENNIIDÆ.

BLENNIES.

Body oblong or elongate, naked or covered with moderate or small scales, which are ctenoid or cycloid; lateral line variously developed, often wanting, often duplicated; mouth large or small, the teeth various; gill membranes free from isthmus or more or less attached to it; pseudobranchiæ present; ventrals jugular or subthoracic, of one spine and 1 to 3 soft rays, often wanting; dorsal fin of spines anteriorly, with or without soft rays; anal fin long, similar to soft dorsal; caudal well developed. Vertebræ in moderate or large number, 30 to 80; hypercoracoid (or "scapula") perforate; shoulder girdle normally formed; suborbital without bony stay.

Fishes of moderate or small size, mostly living near the shore in the tropical and temperate or arctic seas; most of them carnivorous, the Clininæ, so far as known, ovoviviparous, the rest mostly oviparous. Dr. Gill divides the group into six families, but the relations of these are very close, and the distinctive characters of some of the families are subject to exceptions.

I. Tropical blennies with the vertebræ mostly in moderate number, usually fewer than 45; lateral line usually arched high above the pectoral; dorsal fin with one or more soft rays posteriorly; anal spines little developed; ventrals well developed, usually I, 3; gill membranes broadly united, free from the isthmus.

a. Clininæ: Body scaly; lateral line high anteriorly; species ovoviviparous as far as known.

b. Dorsal divided into three fins; scales ctenoid; rather large...... *Tripterygion*, 1.

bb. Dorsal fin continuous; scales small; shoulder girdle without hook; maxillary normal; mouth large.................................... *Zacalles*, 2.

aa. Body scaleless; species viviparous; teeth *comb-shaped*, in a single row; vomer and palatines toothless, or nearly so; lateral line usually arched in front; soft dorsal about equal to spinous.

c. *Blenniinæ:* Teeth all fixed, attached to the bones of the jaws; carnivorous.

d. Gill-opening relatively large; caudal rounded; gill membranes broadly united, nearly or quite free from the isthmus; one or both jaws with posterior canines.................................... *Blennius*, 3.

dd. Gill-opening reduced to a small slit; one or both jaws with posterior canines; caudal rounded or angular.

e. Dorsal elevated in front.................................... *Petroscirtes*, 4.

ee. Dorsal not elevated in front.............................. *Aspidontus*, 5.

cc. *Salariinæ:* Teeth all movable, implanted on the skin of the lips; herbivorous.

f. Posterior canine wanting.

g. Dorsal continuous.................................... *Salarias*, 6.

gg. Dorsal deeply divided.............................. *Scartichthys*, 7.

II. Blennies, arctic or subarctic; the vertebræ in large number, 50 or more; lateral line various; scales small, cycloid, rarely wanting.

h. Gill-membranes not continued forward below, the membranes broadly united, sometimes joined to the isthmus; ventral fins small or obsolete.

i. Pectoral fins relatively short or wanting, never pointed, and not more than half as long as head; pyloric cœca few or none.

j. Body not covered with crosswise tubes running at right angles to the lateral line.

k. Dorsal fin composed of spines only.

l. *Chirolophinæ:* Ventral fins well developed, I, 3; gill membranes free from isthmus.

m. Lateral line obsolete, represented anteriorly by a row of pores; top of head covered with matted cirri; teeth in two rows so aligned as to form a cutting edge.

n. Head scaly.............................. *Azuma*, 8.

nn. Head naked.......................... *Bryostemma*, 9.

ll. Ventral fins rudimentary or wanting, not more than one soft ray present; dorsal spines short and rigid.

o. *Pholidinæ:* Lateral line obsolete; carnivorous.

p. Ventral fins reduced to a single spine, with a rudimentary ray; anal spines small.

q. Head scaly...................... *Enedrias*, 10.

qq. Head naked.

r. Caudal fin well developed........ *Pholis*, 11.

rr. Caudal fin very slender, coalescent with dorsal and anal.............. *Gunnellops*, 12.

pp. Ventral fins wanting; no anal spine; top of head with fleshy crests; body partly naked; gill-membranes forming a fold across the isthmus.......................... *Alectrias*, 13.

kk. Dorsal fin with its posterior part composed of numerous soft rays; no lateral line; no ventral fins.

s. *Eulophiinæ:* Scales wanting; body greatly elongate, the dorsal fin with about 120 spines and about 12 soft rays.

Eulophias, 14.

ss. Neozoarcinæ: Scales present; body not greatly elongate, the dorsal of 28 to 42 spines and 50 or more soft rays.

t. Dorsal fin with about 40 spines and about 50 soft rays; a short tentacle above the snout .... *Neozoarces*, 15.

tt. Dorsal fin with about 30 spines and about 75 soft rays; no tentacle above snout. *Zoarchias*, 16.

jj. Dictyosominæ: Body covered with cross-wise tubes at right angles with the lateral line, these forming an elaborate network over the body; dorsal of spines only; gill-membranes broadly united, free from the isthmus. Ventrals obsolete, forming a scale-like appendage in the young, which disappears with age .... *Dictyosoma*, 17.

ii. Opisthocentrinæ: Pectoral fins long and rather pointed, about as long as head; dorsal high; gill-membranes broadly united, free from the isthmus; no lateral line; no ventral fins; species herbivorous.

u. Dorsal with its posterior spines short, rigid, and sharp, the anterior flexible.

v. Head with small scales; dorsal with hindmost spines only stiff. *Opisthocentrus*, 18.

vv. Head naked; dorsal with spines becoming strong near the middle, and hindmost ones heavy......... *Abryois*, 19.

uu. Dorsal spines all flexible; head naked. *Pholidapus*, 20.

hh. Stichæinæ: Gill-membranes continued forward below, the membranes nearly separate and free from the isthmus; dorsal of slender pungent species only; species herbivorous.

w. Lateral line present, single, double or triple; body moderately elongate.

x. Lateral lines three or more on each side.

y. Lateral lines all three complete, each with lateral branches.

z. Lateral lines each with numerous short branches, each ending in a pore. *Eruogrammus*, 21.

zz. Lateral lines each sending out branches at right angles which connect with the other lateral lines, thus covering the whole body with a network of lines .... *Ozorthe*, 22.

yy. Lateral lines without branches all three being incomplete. *Stichæopsis*, 23.

xx. Lateral line single on each side.

a′. Head moderate, not especially depressed, the eyes large............*Stichæus*, 24.

aa′. Head large, depressed, and pike-like, the eyes small.........*Dinogunnellus*, 25.

ww. Lateral line obsolete; body eel-shaped.

b′. Pectoral fin with its upper and middle rays shortened; teeth both on vomer and palatines ....*Leptoclinus*, 26.

bb′. Pectoral fin with the middle rays longest; palatine teeth small or wanting. *Lumpenus*, 27.

1. TRIPTERYGION Risso.

Tripterygion Risso, Europe Méridionale, III, 1826, p. 241 (*nasus=tripteronotus*).
Enneapterygius Rüppell, Neue Wirbelthiere, 1837, p. 2 (*pusillus*).
Enneanectes Jordan and Evermann, Proc. Cal. Ac. Sci., 1895, p. 501 (*carminalis*).
Gillias Evermann and Marsh, Rept. U. S. Fish Comm., 1899, p. 357 (*jordani*).

Body rather robust, covered with moderate ctenoid scales; lateral line complete or incomplete; mouth moderate, the jaws equal; no tentacle on nape; no hook on shoulder girdle; eye large; dorsal fin divided into 3 fins, the first of 3 or 4 slender spines, the second of 10 to 24, the soft dorsal of 7 to 15 rays; caudal rounded; anal fin long; pectoral long, the lower rays simple and thickened. Small fish of the rock-pools of the Tropics, found in most seas.

This group has been divided into four subgenera on minor characters. These may be thus defined:

a. Orbit without filament above.
  b. Lateral line said to be complete; dorsal rays III-XVII-12; scales rather small, 40...*Tripterygion.*
  bb. Lateral lines well developed anteriorly, becoming obsolete posteriorly; dorsal rays III-X to XV-7 to 10; scales large, about 35............*Enneapterygius.*
  bbb. Lateral line almost obsolete; dorsal rays III-X-7; scales large, rough, about 35 ....*Enneanectes.*
aa. Orbit with a fleshy filament above.
  c. Lateral line interrupted, weakly developed behind; dorsal rays III-XII to XVII-7 to 12; scales large, 33 to 40..............................*Gillias.*
  cc. Lateral line said to be complete; dorsal rays V or VI-XVIII to XX-12 to 14; scales small, 40 to 50 ....(*nigripinne.*)

The two Japanese species belong to the division called *Gillias.*

a. Gillias: Orbital tentacle present; lateral line incomplete.
  b. Dorsal III-XIV-10; A. 21; body with dark vertical bands........*etheostoma*, 1.
  bb. Dorsal III-XVII-12; A. 27; body plain, the caudal mostly black..*bapturum*, 2.

1. TRIPTERYGION ETHEOSTOMA Jordan and Snyder, new species.

Head 4 in length; depth $4\frac{1}{2}$; depth of caudal peduncle $2\frac{5}{6}$ in head; eye $3\frac{1}{2}$; interorbital space 8; snout 3; D. III-XIV-10; A. I, 20; P. 16; scales in lateral series 37.

Body short, subcylindrical anteriorly, deepest above vent; caudal peduncle narrow, compressed; profile of head steep; eye large, directed obliquely upward; interorbital space narrow, convex, the orbital rim projecting; jaws equal maxillary, except posterior part, concealed, reaching a vertical a little behind anterior edge of pupil; cleft of mouth somewhat oblique; teeth minute, in bands on jaw and vomer; gill-membranes forming a broad fold across the isthmus; anterior edge of shoulder-girdle sharp, without protuberances of any kind; gill-rakers on first arch 6, very short; slit behind last gill small; anterior nostril with a small, flat tentacle; a similar tentacle on upper posterior part of eye; no other cirri or tentacles on head.

Head naked; scales of body ctenoid, those of belly cycloid, a small area at base of ventrals and anteriorly to pectorals naked. Number of scales in an oblique series between lateral line and insertion of second dorsal, counting upward and forward, 4; between insertion of anal and lateral line, 10; lateral line interrupted, anterior part ending a little in advance of base of soft dorsal, the posterior part beginning 2 or 3 scales forward on the next lower row, extending to base of caudal, the posterior part without pores, each scale with a deep and narrow scallop.

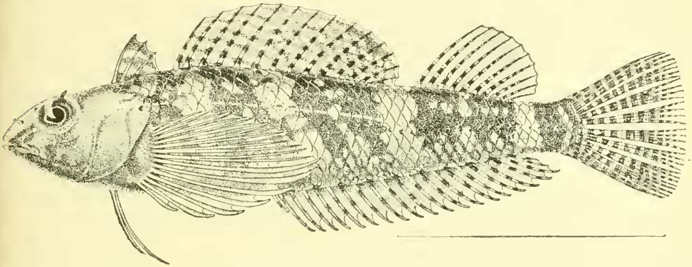

FIG. 1.—TRIPTERYGION ETHEOSTOMA.

Spinous dorsal in 2 parts, the anterior of 3 slender spines, the second and third successively shorter than the first, which is contained $2\frac{5}{6}$ times in head; in some specimens the membrane uniting the last spine with the back reaches the insertion of the second dorsal; spines of second dorsal slender, highest near the middle of fin; $1\frac{2}{3}$ in head, rays of soft dorsal not branched, the first longest, $1\frac{1}{2}$ in head; membranes of dorsals not incised, that of the first with shallow scallops between the spines. First ray of anal about half as long as the second, the following rays blunt, the tips about as large as the bases, the length $2\frac{1}{2}$ in head; membranes of fin deeply incised between the rays; caudal convex posteriorly, $1\frac{1}{8}$ in head; pectorals large, pointed, the middle rays longest extending to base of sixth anal ray, the lower 7 rays simple, considerably enlarged distally, the membrane incised between them, leaving the tips free; most of the upper rays branched, the membrane entire; ventral spine minute, the rays united by membrane for about half their length, outer ray shorter than the inner.

Color of female; body yellowish white, crossed by 6 nearly vertical dark brown bands, very irregular in outline, not extending on ventral surfaces, the first passing downward from between the first and second spinous dorsals, behind base of pectoral, the second below anterior part of second dorsal, the third below the posterior part, the fourth and fifth below the soft dorsal, the sixth near base of caudal; the first to fourth bands more or less divided by light blotches within their boundaries; nape with a small poorly defined cross-band; head irregularly blotched with brownish; first dorsal with elongate dusky clouds; second dorsal with slightly oblique dusky bands anteriorly, which branch and intercept, becoming reticulations posteriorly; spines and rays of soft dorsal, anal, and caudal with alternating dusky spots and clear spaces, appearing like oblique bands on the dorsal and anal and vertical bands on the caudal; pectoral faintly clouded with dusky. In the males the ground color is much darker except a narrow white space behind the second and another behind the third dorsal fin, forming vertical bands in bold contrast with the rest of the body. The dark bands described in the female can easily be traced, though they are not so prominent. The fins, except caudal, are nearly black, the second dorsal narrowly edged with white, the soft dorsal and anal with a large white spot on posterior ends. The caudal is colored as in the female. The fins of the male are higher than those of the female, the first dorsal spine about 2 in head, membrane with a broad, deep scallop between second and third dorsal spines.

Described from specimens about 65 mm. long from Misaki. Type No. 7065, Zoological Museum, Stanford University. Cotype No. 50299, U.S.N.M.

Table showing fin-ray and scale counts of seven specimens from Misaki.

Dorsal.	Anal.	Pectoral.	Scales.
III, XV, 10	I, 20	15	35
III, XIV, 11	I, 19	16	37
III, XV, 10	I, 20	15	36
III, XV, 10	I, 21	15	36
III, XIV, 10	I, 20	15	34
III, XIV, 9	I, 20	15	35
III, XV, 9	I, 19	16	36

We have many specimens from Misaki, 2 from Wakanoura, and one from Atami, province of Izu. These beautiful little fishes are found in the rock pools at the ends of the promontories. They cling close to the rocks with their paired fins, even to vertical walls of cliffs.

(*etheostoma*, the darter, a genus of *Percidæ*, of similar appearance and habit.)

2. TRIPTERGION BAPTURUM Jordan and Snyder, new species

Head $4\frac{1}{5}$ in length; depth 6; depth of caudal peduncle $3\frac{1}{4}$ in head; eye $3\frac{1}{4}$; interorbital space 10; snout $3\frac{1}{4}$; D. III–XVII–12; A. I, 26; P. 17; scales in lateral series 43.

Body elongate, more slender than in *T. etheostoma;* caudal peduncle rather narrow; snout short, anterior profile steep; interorbital space very narrow, concave; eye large, high up, directed obliquely upward, mouth rather large, posterior half of maxillary exposed, extending to a vertical through anterior part of pupil; teeth in narrow bands on jaws and vomer, the outer teeth of jaws slightly enlarged; gill-opening forming a broad fold across the isthmus; shoulder-girdle without protuberances; nasal and orbital tentacles present; two rows of mucus pores below and behind eye; similar pores on chin, preopercle, and occiput; head naked; body with thin, finely ctenoid scales, loosely attached; belly and breast and space anterior to pectoral naked; number of scales in an oblique series between lateral line and insertion of second dorsal, counting upward and forward 5; between insertion of anal and lateral line 9 or 10; lateral line incomplete, on about 28 scales ending below anterior part of soft dorsal, not continued on caudal peduncle.

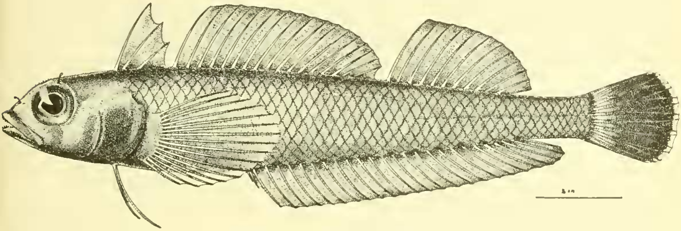

FIG 2.—TRIPTERGION BAPTURUM.

Spinous dorsal in 2 parts, the anterior of 3 slender spines, the first contained $1\frac{2}{3}$ times in head; middle spines of second dorsal highest, 2 in head; longest ray $1\frac{1}{2}$; anal rays not thickened toward the tips, the longest $2\frac{1}{3}$ in head; caudal rounded, $1\frac{2}{5}$ in head; pectoral pointed, the lower 8 rays simple, no larger toward tips than at bases, upper rays branched, membrane incised between lower rays, entire between upper ones; outer ventral ray about $\frac{1}{3}$ of its length shorter than the inner one.

Color in alcohol, body without bands, pale yellowish, each scale with a dusky border; opercle with a large, pale-brown blotch; snout and lips dusky; first dorsal blackish, the second dusky along the basal part, the third with a few dark specks; anal plain, a row of very indistinct, small dusky spots on body along its base; caudal black, the base and tip white; pectoral slightly dusky on its upper edge.

The species is known from a single specimen 50 mm. long from Misaki. It is recorded as type, No. 7066 Zoological Museum, Stanford University. It is easily distinguished from *T. etheostoma* by the absence of dark bands on the body, by the thick caudal with white base and tip, as well as by the fin rays.

(*βαπτός*, dyed; *οὐρά*, tail.)

2. ZACALLES Jordan and Snyder.

Zacalles JORDAN and SNYDER, new genus of Blenniidæ (*bryope*).

Body rather elongate; head short, naked, with tufted filaments above the eye; mouth large, with rather stout, bluntish teeth in the jaws; teeth on vomer and palatines; dorsal fin long, with numerous slender spines and many soft rays, the spines subequal; pectorals moderate; scales small, thin and smooth; lateral line developed anteriorly only; shoulder-girdle without upturned hook-like process.

Handsome little fishes of the tide-pools of Japan, allied to the American genera *Lepisoma* and *Labrisomus* (*Gobioclinus*).

(*ζακαλλής*, very pretty.)

3. ZACALLES BRYOPE Jordan and Snyder, new species.

Head 4⅕ in length; depth 6⅕; depth of caudal peduncle 3½ in head; eye 5; interorbital space 11½; snout 4½; D. XXV–17; A. I., 31; P. 14.

Body rather short, compressed; caudal peduncle deep, greatly compressed; eyes far forward, directed somewhat obliquely; interorbital space narrow, with a concave furrow; snout short; jaws equal; maxillary very long, 1⅔ in head, extending far beyond eye, the posterior half exposed; interior borders of lips fringed; teeth short, blunt, in a single row laterally, in bands on anterior part of jaws, the outer ones slightly enlarged; small teeth on vomer and palatines; gill-membrane forming a broad fold across the isthmus; anterior edge of shoulder-girdle with a sharp ridge; no protuberances; pseudobranchiæ large; gill-rakers on first arch 7+9, long, very slender, widely spaced; nostrils tubular, the anterior one with a bifid tentacle; upper part of eye with 3 broad, branched tentacles, the anterior one highest; head naked; body with very thin, cycloid, partly embedded scales, about 21 in transverse series; a naked area above lateral line and on breast and belly; lateral line incomplete, with about 21 pores, ending above tip of pectoral; dorsal fin continuous, extending from nape to caudal peduncle; spines slender, soft at tips, highest in the region of the seventh, the length contained about 2 times in head; soft dorsal higher than the part of spinous dorsal just preceding it, the highest rays 2½ in head; anal rays low, the posterior ones slightly higher than the anterior ones, 3½ in head; caudal rounded, 1¾ in head; pectoral rays simple, the membranes incised between tips of 3 or 4 lower ones, fin rounded posteriorly, not quite reaching a vertical through anal opening; ventral spine as long as second ray, slender; rays 2, the first somewhat longer than the second.

Color, light brown, tinged with olive, a series of 9 or 10 dark vertical bands which are broadest near the middle, narrow or pointed below, encroaching above on basal part of dorsal fin; posteriorly the bands grow wider in proportion to length, the last one often represented by a round spot; a dark round spot on base of caudal; head and body with white specks, a group of them on base of pectoral, a row of prominent ones along middle of body; chin with large white blotches; branchiostegal region spotted with black; ocular tentacles dusky; lateral line white; dorsal with an oblong black ocellus in the region of the second spine; anterior part of fin dark, flaked with small, light spots, posterior part lighter, with 1 or 2 rows of narrow, oblong, vertical dark spots; rays with small black spots, the lower ones darker than the upper; 1 or 2 outer rays of caudal with dark specks; anal with a dusky subterminal margin, a row of indistinct, dusky spots along the base; pectoral with a small black spot on base; ventrals mostly dusky. Some specimens are lighter in color than the one described, but the general color-pattern remains about the same.

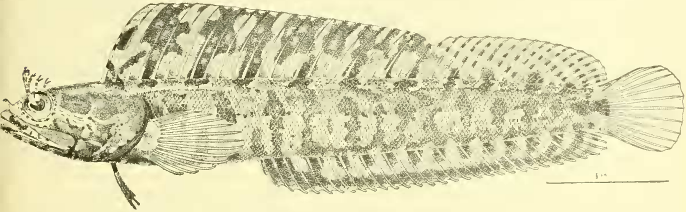

Fig. 3.—Zacallus bryope.

Type No. 7067, Zoological Museum, Stanford University, from Misaki, Japan. Cotype No. 50296, U.S.N.M.

We have very many specimens about 70 millimeters long from Misaki, Wakanoura, and Enoura. The species lives in the clear, warm tide pools with *Tripterygion etheostoma*, *Scartichthys enosimæ*, and *Blennius yatabei*.

(*βρύον*, moss; *ὠπή*, face.)

Fin-ray counts of *Zacalles bryope:*

Dorsal.	Anal.	Pectoral.
XXVI, 17	I, 31	13
XXVI, 18	I, 32	13
XXV, 18	I, 31	—
XXVI, 16	I, 31	13

3. BLENNIUS (Artedi) Linnæus.

Blennius Artedi, Genera Piscium, 1738, p. 27.
Blennius Linnæus, Syst. Nat., 10th ed., 1758, p. 256 (*galerita*).
Salaria Forskål, Descr. Anim., 1775, p. 22 (*basiliscus*).
Pholis Fleming, Brit. Anim., 1828, p. 207 (*lævis=pholis*); not *Pholis* Scopoli, 1777.
Adonis Gronow, Cat. Fish., Ed. Gray, 1754, p. 93 (*pavoninus=ocellaris*).
Lipophrys Gill, American Naturalist, June, 1896, p. 498 (*pholis*).

Body oblong, compressed, naked; head short, the profile usually bluntly rounded; mouth small, horizontal, with a single series of long, slender, curved, close-set teeth in each jaw, besides which, in the lower jaw at least, is a rather short and stout fang-like canine tooth on each side; premaxillaries not protractile; gill-openings wide, extending forward below, the membranes free from the isthmus, or at least forming a broad fold across it; dorsal fin entire, or more or less emarginate, the spines slender; pectorals moderate; ventrals well developed, I, 3; no pyloric cæca; lateral line developed anteriorly. Species numerous, lurking under rocks and algæ in most warm seas; some species in the lakes of northern Italy.

(*blennius*, the ancient name, from βλέννα, slime.)

4. BLENNIUS YATABEI Jordan and Snyder.

Blennius yatabei Jordan and Snyder, Proc. U. S. Nat. Mus., 1900, p. 374, pl. xix; Misaki.

Head $3\frac{2}{3}$ in length; depth $3\frac{2}{3}$; depth of caudal peduncle $2\frac{2}{3}$ in head; eye $4\frac{1}{3}$; interorbital space 12; D. XII, 16; A. I., 19; P. 14.

Body rather short, compressed; the caudal peduncle deep, greatly compressed; snout short, blunt, its outline rising abruptly to border of eye; mouth slightly oblique, maxillary extending to a vertical through the posterior border of eye, shorter in some specimens; upper lips wide and thin, jaws equal; teeth in a single row in each jaw, curved, incisor-like, the cutting edges rounded, closely apposed to each other; two strong curved canines in each jaw, no teeth behind the canines; a single strong tooth on the vomer. Edge of shoulder-girdle without protuberances; gillrakers on first arch reduced to 5 or 6 small projections. Nostrils with low rims, the anterior one with a small cirrus; upper edge of eye with a long cirrus, one side of which is branched. Body naked; lateral line arched over the pectoral, the pores large and distinct anteriorly, becoming indistinct and finally disappearing on the posterior third of body. Dorsal extending from occiput to basal rays of caudal; a shallow notch between the spinous and soft part; the spinous part highest near the middle, about 2 in head; the last spine not reaching upward to edge of membrane, a peculiar character present in each specimen; longest rays somewhat higher than the spines. Anal in males bearing a large soft pad on first spine and ray, the membrane between them deeply incised; in females the spines and rays are all similar; length of highest rays $2\frac{3}{4}$ in head; caudal rounded; pectoral rounded, membranes of 4 or 5 lower rays incised; ventral rays almost entirely connected by membrane.

Color in spirits, olive brown; body with small blackish spots, generally gathered in 3 groups, which are arranged in vertical rows, in some specimens appearing as 3 lateral rows of large blotches with small spots between them; membrane between first and second spines with a dark spot about as large as eye; 12 or 14 small dark spots along base of dorsal, sometimes absent on large examples; anal dark, the tips of rays white; pectoral dusky, the upper part lighter; in life the spots on lower part of body are yellowish, the throat suffused with pinkish, the tips of ocular tentacles brick red. Many specimens from Misaki, Enoshima, and Wakanoura have enabled us to add somewhat to the original description. The species is common in the rock pools at the extremities of the headlands in southern Japan. It is especially abundant about the sacred island of Enoshima.

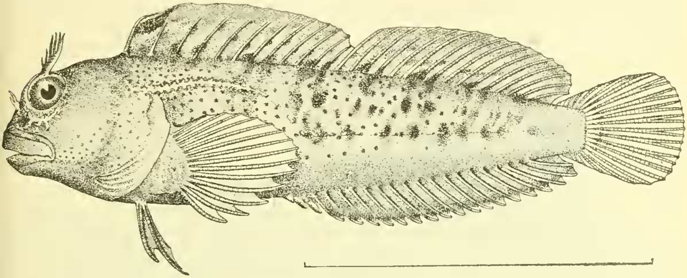

FIG. 4.—BLENNIUS YATABEI.

("This species is named in memory of our old friend and college mate, Riokichi Yatabe, formerly professor of botany in the University of Tokyo, drowned in 1889 in a sad accident in the Bay of Kamakura, near Enoshima.")

4. PETROSCIRTES Rüppell.

Petroscirtes RÜPPELL, Atlas Fische, 1828, p. 110 (*mitratus*).
Blennechis CUVIER and VALENCIENNES, Hist. Nat. Poiss., X, 1836, p. 279 (*filamentosus*).

This genus is closely allied to *Aspidontus*, differing chiefly in the elevated dorsal, the anterior spines especially being higher than the others. Certain minor characters also distinguish the species known to us. Tropical seas of Asia, living in the tide pools.

(*πέτρος*, rock; *σκιρτάω*, to leap.)

5. PETROSCIRTES ELATUS Jordan and Snyder, new species.

Head $4\frac{2}{5}$ in length; depth $3\frac{4}{5}$; depth of caudal peduncle $1\frac{2}{3}$ in head; eye $3\frac{1}{8}$; interorbital space 5; D. XII, 15; A. I, 16; P. 14.

Body short and deep; the head large, with a short, rounded snout; interorbital space broad, convex; jaws with a row of long, slender, curved, close-set teeth, followed on each side by a single strong canine; canines of lower jaw much longer than those of upper, fitting into pits in the upper jaw; tongue very short; valves of mouth far back; gill opening restricted to a slit about equal in width to the vertical diameter of eye; pseudobranchiæ large; gill rakers on first arch 7 or 8, very small, pointed. Head and body naked; chin with a pair of short flaps; upper part of eye with a long flat filament; each side of neck with a small flap-like filament, below which is a minute villus. Lateral line incomplete, consisting of 3 or 4 long tubes extending upward and backward along base of anterior end of dorsal fin.

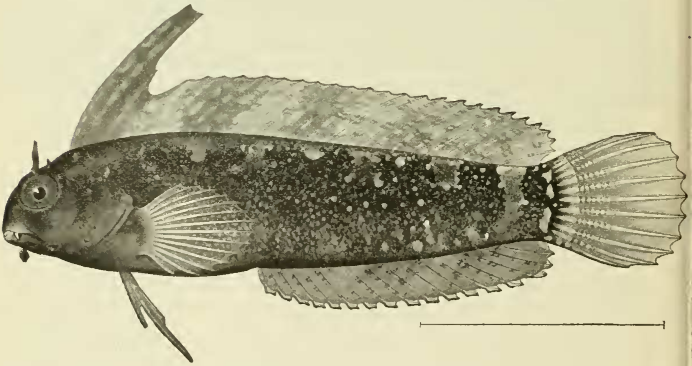

FIG. 5.—PETROSCIRTES ELATUS.

Dorsal inserted on nape, the anterior part elevated; the first spine highest, contained $3\frac{1}{8}$ times in the length; second spine of about equal height, the third much shorter, equal to the following ones, $6\frac{2}{3}$ in length; membrane between third and fourth spines with a deep scallop, notched between the following spines and rays, leaving the tips free; rays equal in length to the posterior spines; posterior rays of anal longest, $1\frac{2}{5}$ in head; a small fleshy knob at tip of each ray, except the last three; membrane incised between the rays; caudal rounded, $4\frac{1}{6}$ in the length, the membrane scalloped between the rays, leaving their tips free; pectoral rounded, its length $1\frac{1}{8}$ in head; middle ray of ventral long and filamentous, reaching the vent.

Color in spirits, brownish, the upper half of side with six indistinct blackish blotches; other parts of the body with rather indefinite dark specks; filaments on head blackish; anterior elevated part of dorsal dusky, the other parts of fin with dusky clouds; rays of anal with dusky cross bands; caudal dark at base, the rays crossed by dark lines near their bases.

The species is known to us from a single specimen only, 71 mm. long. Type, No. 7071, Stanford University Zoological Museum, taken by Capt. Alan Owston at Yaeyama, Ishigaki Island, in the Riukiu Archipelago.

Dr. Ishikawa[1] notes a specimen in the Imperial Museum from Miyakoshima allied to the present species, under the name *Petroscirtes mitratus*, and an *Aspidontus* from the same island under the name of *Petroscirtes dispar* Günther, a name proposed originally for specimens from Amoy belonging to two distinct species.

(*elatus*, elevated.)

5. ASPIDONTUS Cuvier.

Aspidontus (Cuvier) Quoy and Gaimard, Voy. Astrolabe, III, 1834, p. 719, (*tæniatus*).

Omobranchus (Ehrenberg, pl. XI, f. 91) Swainson Class'n. Fishes, II, 1839, p. 274 (*fasciolatus*).

Body rather elongate, naked; mouth small, with a single series of immovable teeth in the jaws; behind this a strong, curved canine, those of lower jaw longer than those of upper; head sometimes with filaments; gill-opening reduced to a small fissure above the root of the pectoral; dorsal fin low, the anterior spines not elevated; air-bladder present; pseudobranchiæ present; no pyloric cœca. Species numerous in the East Indian Seas.

(ἀσπίς, shield; ὀδούς, tooth.)

a. Body yellowish, with blackish cross-bars anteriorly, and many black spots; teeth 18–18; D. XII, 22; A. 25..*elegans*, 6
aa. Body grayish with two broad lengthwise stripes of black; teeth 28; D. 10, 21; A. 20; caudal truncate..*trossulus*, 7
aaa. Body plain grayish or brownish, with no sharply defined marks.
  b. Teeth 26–28; head with faint dark bands; side with 4 dark lines anteriorly ....*dasson*, 8
  bb. Teeth 36–40; coloration plain..*japonicus*, 9

6. ASPIDONTUS ELEGANS (Steindachner).

Petroscirtes elegans Steindachner, Ichth. Beitr., V, 1876, p. 169; Nagasaki.

Petroscirtes lineopunctatus[2] (Guichenot Ms.) Sauvage, Bull. Sci. Philom., IV, 1880, p. 216; Japan; Coll. A. Étoffe.

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[1] Prel. Cat., 1897, p. 35.

[2] The following is a translation of the description given by Dr. Sauvage:

Head 7 in total length; depth, 7; D. 34; A. 25. Snout anteriorly truncate, longer than the eye; lower posterior canine much larger than upper; no tentacle on the head; interorbital space convex, as broad as eye; caudal emarginate. Color brownish yellow, sown with many small black points, three black vertical bands on the head, and three of the same color on the anterior part of the trunk, these bands extending on the back; a black spot on the caudal peduncle; tips of rays of dorsal and anal blackish. Length, m. 0.080. Japan. A. Étoffe. (Sauvage).

Head 5 in length; depth $5\frac{1}{2}$; depth of caudal peduncle $2\frac{1}{2}$ in head; eye $3\frac{2}{3}$; snout 4; interorbital space 8; D. XII, 22; A. I, 24; P. 13.

Body moderately elongate, compressed; the caudal peduncle deep; head as deep as body; snout short, blunt; anterior profile steep, rounded above eye; jaws subequal, the lower slightly shorter than the upper; mouth horizontal, the cleft extending to a vertical through anterior edge of pupil; jaws with a series of long, slender, close-set teeth followed on each side by a single canine, which is separated from the others by a small space; canines of lower jaw much longer than those of upper; no teeth on vomer and palatines; teeth in each jaw numbering 18 besides canines; gill-opening restricted to a small space above base of pectoral; gillrakers on first arch reduced to 8 or 10 minute protuberances; no barbels on head. Head and body naked; no lateral line. Dorsals continuous; no notch between spinous and soft parts, inserted on nape anterior to a vertical through gill-opening, the last ray united by a membrane to base of caudal, the membrane slightly notched between the rays, spines somewhat higher than the rays, about $5\frac{1}{2}$ in the length of body; anal inserted below base of twelfth dorsal spine; last ray united by membrane to caudal peduncle; the membrane deeply notched between the rays; the posterior or longest rays contained about 9 times in the length; caudal rounded, the membrane slightly scalloped between the rays; pectoral rounded, slightly longer than the caudal, $5\frac{1}{2}$ in the length, the rays all simple; ventrals $1\frac{1}{3}$ in head.

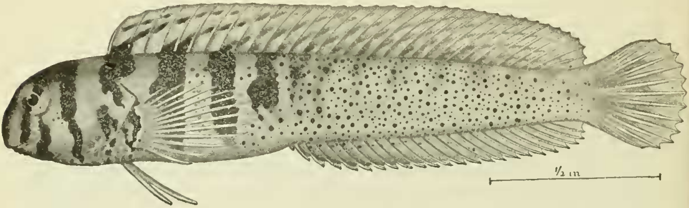

FIG. 6.—ASPIDONTUS ELEGANS.

Color in spirits, dull yellowish-olive, covered throughout with minute, round, black spots and specks, the anterior parts with vertical blackish bars, broad above, growing narrower and pointed below, the bars more distinct in the region of the pectoral, becoming narrower and shorter posteriorly and disappearing near middle of body. In different individuals the bars vary somewhat in shape and size, there always being one at insertion of dorsal, each space between the bars beneath the pectoral usually with a narrow dead white stripe; head with dark vertical bars, usually one on anterior part of snout, one passing through eye, another extending downward from lower margin of eye, and a fourth and broader bar posterior to the eye; spots of throat elongate, in some places forming reticulations, the interspaces dead white; base of pectoral dead white with jet black spots or reticulations, in some cases yellowish-olive with black specks like posterior part of body; the 3 or 4 dark bars encroaching on anterior part of base of spinous dorsal, above which are a few indistinct, dusky, oblique bars; posterior part of dorsal with a few minute spots near the margin; anal with a narrow edge of white anteriorily, above which is a dusky band; a row of black points along anterior basal part of fin; other fins somewhat dusky. In life the vertical bands of body are a dark wine color, becoming greenish brown posteriorly, the spaces between with narrow greenish-white bands; base of pectoral and branchiostegal region with bluish-white reticulations; throat wine color; base of dorsal with a row of pearly spots, which show very indistinctly on the preserved specimen; posterior part of dorsal with a vinaceous edging; anal with 3 rows of small pearly spots, the posterior rays tipped with wine color.

This species is found about the rocky headlands of southern Japan. Our numerous specimens are from Misaki, Enoshima, Wakanoura, and Hakodate. It is one of the most prettily colored of little fishes.

(*elegans*, elegant.)

7. ASPIDONTUS TROSSULUS Jordan and Snyder, new species.

?? *Petroscirtes bankieri* Richardson, Voy. Sulphur, Fishes, 1846, p. 136, pl. LXIV, figs. 8, 9; Hongkong.

Head $4\frac{1}{6}$ in length; depth $4\frac{3}{4}$; depth of caudal peduncle $2\frac{2}{5}$ in head; eye $3\frac{2}{3}$; interorbital space $3\frac{1}{8}$; snout $3\frac{1}{8}$; D. X. 21; A. I. 19; P. 13.

Body rather stout, compressed, the caudle peduncle deep; head large, broad, interorbital space wide and flat; eyes rather large, directed laterally; snout blunt; lower jaw a little shorter than the upper; mouth horizontal, the cleft extending to a vertical through center of pupil; jaws with a row of long, slender, close-set teeth, followed on each side by a canine separated from the others by a small space; canines of lower jaw very large and strong, fitting into a large pit in the upper jaw, a flap formed by an elongate upward extension from the lip at base of tooth; canine of upper jaw small, scarcely projecting beyond edge of middle teeth; vomer and palatines without teeth; teeth in each jaw numbering 28; tongue very short, ending far back in mouth; valve of roof of mouth located posteriorly; gill-opening restricted to a small slit above base of pectoral. Head and body naked, a pair of small, flat barbels on chin; a minute, slender barbel on upper part of eye; lateral line incomplete, extending near base of dorsal from above gill-opening to a point over tip of pectoral. Spinous dorsal continuous with the soft part, no notch between them, the membrane slightly incised between the rays; spines slender, flexible, the longest contained $1\frac{3}{4}$ times in head, longest rays $2\frac{1}{8}$; membrane of anal scalloped between the rays, their tips free; length of highest rays $2\frac{1}{8}$ in head; the tips of upper and lower rays with short filaments; caudal truncate, length $1\frac{1}{5}$ in head; pectoral rounded, the rays simple, $1\frac{1}{2}$ in head; ventral about equal to pectoral in length.

Color, grayish with two lengthwise stripes of violet black; a broad blackish stripe extending from tip of snout to base of caudal, the width of stripe on anterior part of body equal to diameter of eye, one-half as wide immediately behind eye; a similar, though lighter stripe, extending from lower jaw through lower half of base of pectoral to base of caudal, the upper outline of this band distinct, the lower shading off into the bluish gray of the ventral region, the space between the two bands yellowish white; a narrow, dark band along anterior part of base of dorsal; chin and top of head dusky, the head with a few small black spots above eyes; dorsal with a broad dusky band along the basal half, the upper part with dark spots and reticulations; anal with 5 large dusky spots, the rays narrowly tipped with white; base of caudal with an indistinct vertical band of dusky; pectorals and ventrals light.

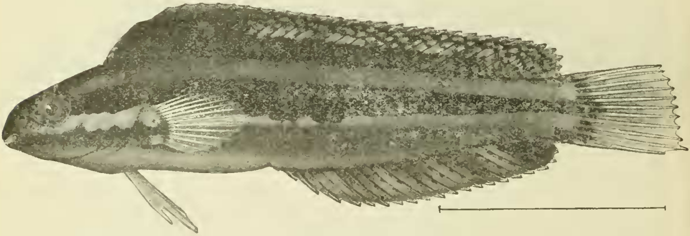

FIG. 7.—ASPIDONTUS TROSSULUS.

This species seems to be distinct from *P. bankieri*. It differs in color from the example described by Richardson, the latter having the median dark lateral band originating at gill-opening, the lower band absent, and the anal without the dark spots, there being instead a dark marginal band. Richardson states that his specimen was badly macerated.

We have one specimen 75 mm. long from Misaki. Numerous others 150 or 200 mm. long were seen in the deep rock pools, but they can be obtained only with great difficulty. It is one of the most beautiful as well as the most active of all the blennies.

(*trossulus*, a dandy.)

8. ASPIDONTUS DASSON Jordan and Snyder, new species.

? Petroscirtes japonicus BLEEKER, Kon. Ak. Wet. Versal. Amst. 2nd Rek., III, p. 246; Jedo.

Head $5\frac{1}{2}$ in length; depth $5\frac{2}{5}$; depth of caudal peduncle $2\frac{1}{3}$ in head; eye $3\frac{1}{2}$; interobital space about 10; snout $3\frac{1}{2}$; D. XII, 22; A. I. 22; P. 13.

Body compressed, the caudal peduncle especially so; snout short, blunt; interorbital space narrow, convex; eyes directed somewhat obliquely; mouth small, the cleft extending to a point below anterior edge of orbit; lower jaw shorter than upper; lips with pendent flaps at bases of canine teeth, that of the lower lip the more prominent; jaws with a row of long, slender, close-set teeth, 26 in the upper, 28 in the lower series, followed by a single canine on each side, which is separated from them by a narrow space, the lower canines much longer than the upper, fitting into pits in the upper jaw ; vomer and palatines without teeth; gill-opening restricted to a narrow slit above base of pectoral; pseudo-branchiæ large; gillrakers on first arch 8 or 10, very small.

Head and body naked, no filaments on head; lateral line incomplete, the pores extending along upper part of body to a short distance beyond tip of pectoral from whence the lateral line is indicated by a row of slight pits or scars which bends downward and extends along middle of body to base of caudal.

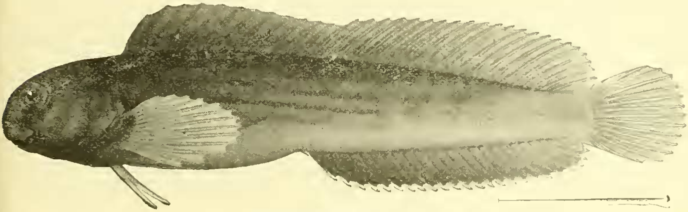

FIG. 8.—ASPIDONTUS DASSON.

Dorsal inserted above gill-opening, membrane of posterior ray reaching base of caudal fin; margin of fin with shallow scollops between the rays, posterior half of fin higher than anterior half, the longest ray contained $1\frac{1}{4}$ times in head; anal lower than dorsal, the longest rays 2 in head, membrane notched between the tips of rays; caudal rounded, $1\frac{1}{5}$ in head; pectoral rays simple, the fin rounded, equal in length to head; ventrals short, nearly 2 in head.

Color in spirits brownish, darker anteriorly than posteriorly; side with 4 dark lines extending about halfway back; 1 or 2 indistinct, oblique dark bands on head, the anterior one passing through eye; fins dusky, without spots or bands; rays of anal tipped with white.

We should identify our specimens with *Petroscirtes japonicus* were it not that Bleeker states in his description that the teeth in the jaws number from 36 to 40, while our specimens have but 26 to 28. It is not easy to suppose that Bleeker should have made an error in counting these teeth, though he might have done so in copying his notes. In his brief description no other difference appears.

We have 2 specimens about 60 mm in length from Wakanoura, and a smaller one from Agu in Shima. The former is Type No. 7070, Stanford University Zoological Museum; the other is Co-type No. 50300, U.S.N.M.

(ἄσσων, very swift.)

9. ASPIDONTUS JAPONICUS Bleeker.

Petroscirtes japonicus BLEEKER, Versl. Kon. Ak. Wet. Amst., III, 1869, p. 246; Jedo.

The following is the substance of Bleeker's description of this fish, which may be the same as our *Aspidontus dasson.*

Head $6\frac{1}{3}$ with caudal, about 5 without; depth $6\frac{1}{3}$ in total (5 to base of caudal); D. XI, 21; P. 13; A. 25.

Body elongate, compressed; forehead above eye very convex; no cirri on occipital crest; eye $4\frac{1}{2}$ in head, less than a diameter apart; snout obtuse but not convex, prominent before the eyes; victus extending to below front of eye; teeth in each jaw close set, obtuse, 36 to 40 in number; a curved posterior canine on each side, the lower canine more than twice as long as the upper; gill opening not smaller than eye; lateral line conspicuous anteriorly; dorsal entire, the spines low, growing progressively longer behind; pectoral rounded, 6 in total length; ventral 11 in length; caudal $6\frac{1}{3}$.

Color dusky reddish, paler below; fins dull orange; iris green. Described from a specimen 83 mm. long, from Yedo (Tokyo). Were it not for the number of teeth counted by Bleeker, we should unhesitatingly identify it with *Aspidontus dasson.*

6. SALARIAS Cuvier.

Salarias CUVIER, Règne Anim., 2d ed., 1829, p. 175 (*quadripinnis*).

This genus differs from *Scartichthys* in having the dorsal fin continuous, without notch; no posterior canines.

(σαλαρία, a modern Greek name of *Blennius basiliscus.*)

10. SALARIAS CERAMENSIS Bleeker.

Salarias ceramensis BLEEKER, Ceram, II, 1852, p. 701; Ceram, Celebes, Boro.—GÜNTHER, Cat. Fish., III, 1861, p. 246; Ceram.

Head 5 in length; depth $3\frac{2}{5}$; depth of caudal peduncle $2\frac{1}{5}$ in head; eye $3\frac{1}{5}$; interorbital space $6\frac{2}{5}$; D. XII, 19; A. I, 19; P. 14.

Body deep and greatly compressed; head small, short, blunt, the anterior profile blunt; eye large, its diameter twice width of suborbital, located in upper, anterior part of head; mouth horizontal, lower jaw somewhat shorter than upper; teeth in a single row in each jaw, minute, slender, close-set, loosely embedded in the fleshy gums, no canines; gill-membranes forming a broad fold across the isthmus; gill-rakers on first arch minute, pointed; pseudobranchiæ well developed, a row of cilia resembling gillrakers along the base; upper edge of eye with a many-branched cirrus, the height of which is less than diameter of eye; a short, flat, fringed tentacle on each side of nape.

Head and body naked; lateral line high on body, incomplete, following contour of back to a point about opposite tip of pectoral, where it ends.

Spinous and soft dorsals continuous, not separated by a notch, the last ray united with upper edge of caudal by a membrane; spines with flexible tips, the highest contained $1\frac{1}{3}$ times in head; rays higher than the spines, about $1\frac{1}{8}$ in head; membrane of anal incised between the rays, leaving their tips free, the longest contained $1\frac{1}{2}$ times in head; caudal convex; pectoral rounded, slightly longer than head, the membrane incised between all the rays, the lower rays somewhat enlarged; ventrals $1\frac{2}{5}$ in head.

Color in spirits, brownish; the sides with many dark, longitudinal lines which are broken up into dots on the upper anterior parts; head with small spots, or dots, on the upper surface; spinous dorsal with small blackish spots and dots inclosing a number of oblong, colorless areas; soft dorsal with many elongate black spots near edge and base of fin; anal with a basal row of 8 or 9 spots, above which are a few dots; caudal with dots on base and along the middle; pectoral with 3 vertical rows of dots; ventrals with 2 or 3 rather large spots.

One specimen of this species was taken by Capt. Alan Owston at Yaeyama, Ishigaki Island of the Riukiu Archipelago. It was previously known only from the East Indies.

(Name from the island of Ceram.)

7. SCARTICHTHYS Jordan and Evermann.

Scartes Jordan and Evermann, Check-List Fishes, 1896, p. 471 (*rubropunctatus*); preoccupied by *Scartes* Swainson, a genus of mammals.

Scartichthys Jordan and Evermann, Fish N. and M. Amer., III, 1898, p. 2396 (*rubropunctatus*).

Body elongate, slowly declining to the caudal; head obliquely compressed, oblong, the profile more or less vertical; eyes lateral, closely approximated, situated at the angle of the profile with the postocular region; usually a cirrus above the eye; gill apertures continuous under the throat, gill membrane free from isthmus; branchiostegals 6; mouth moderate, the contour of the upper jaw semicircular; upper jaw protruding beyond the lower; lips moderate, uniform, and free, concealing the teeth; teeth labial and movable, very slender and recurved, contiguous and uniserial; no posterior canines; dorsal fin divided; anal similar to soft dorsal; caudal obtusely rounded; pectorals moderate, angularly rounded; ventrals approximated, each with 3 simple rays, the internal of which is smallest.

Found in the rock pools of the Pacific, widely distributed.

(σκάρτης, one who leaps; ἰχθύς, fish; the fish having extraordinary powers of throwing itself from pool to pool by leaping into the air when the tide recedes.)

a. Head with a high dermal crest at the nape; dorsal rays, XIII, 21; anal, 23; color, dark brown, with vertical bands of shining greenish................*enosimæ*, 11.
aa. Head without dermal crest; dorsal rays XII, 16; anal, 20; color brown, with dark cross bands and numerous white dots ....*stellifer*, 12.

11. SCARTICHTHYS ENOSIMÆ Jordan and Snyder, new species.

KAËRU-UWO (FROG-FISH).

Head $5\frac{1}{10}$ in length; depth $4\frac{9}{10}$; depth of caudal peduncle 2 in head; eye $4\frac{1}{2}$; interorbital space 13; D. XIII, 21; A. I, 22; P. 14.

Body somewhat elongate, compressed, the caudal peduncle deep, greatly compressed; head blunt, the anterior profile vertical; eye high up and far forward, directed somewhat obliquely; mouth horizontal, on lower part of head; suborbital area about as wide as orbit; upper lip wide, very thin; lower jaw included; cleft of mouth extending to a vertical passing a little behind orbit; teeth minute, slender, very loosely attached to the fleshy gums in a single row; close together like the teeth of a comb, some projecting slightly farther than others at the tips; no canines; no teeth on vomer or palatines; gill-membranes forming a broad fold across the isthmus; anterior edge of shoulder girdle without protuberances; gillrakers minute, slender, pointed; pseudobranchiæ large; a row of papillæ resembling gillrakers extending along base of pseudobranchiæ and downward toward attachment of first gill-arch; anterior nostril with a many-branched cirrus; upper part of eye with a tall, flat, pointed cirrus, its length equal to vertical diameter of eye; occiput with a tall, thin, crest-like flap which extends from interorbital space to nape, its height equal to vertical diameter of orbit; a minute, slender cirrus on each side of nape. Head and body naked; lateral line arched over pectoral, the curve parallel with outline of fin, distinct anteriorly, breaking up near middle of body, becoming indistinct and disappearing posteriorly. Dorsal fin extend-

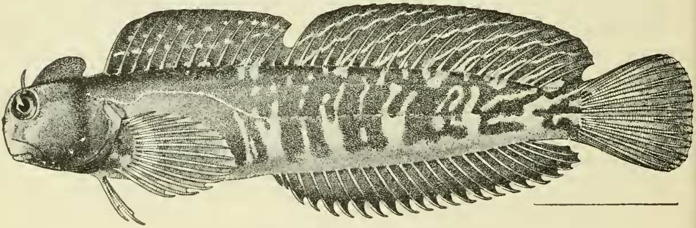

FIG. 9.—SCARTICHTHYS ENOSIMÆ.

ing from nape to base of caudal, the spinous part separated from the soft part by a deep notch; spines slender, very flexible, highest a little anterior to middle of fin, 1$\frac{3}{5}$ in head; longest rays somewhat higher than the spines; membrane of soft dorsal slightly incised between the rays, connecting posteriorly with upper ray of caudal; anal rays with the membrane thickened about them, especially the anterior ones which have thick, corrugated pads; membrane of anal deeply incised between the rays, not connecting posterior ray with caudal peduncle; caudal rounded, its length equal to $\frac{7}{8}$ of head; pectoral acutely rounded, rays simple, the lower ones slightly thickened; membrane of fin incised between the five lower rays; ventrals 1$\frac{1}{2}$ in head.

Color in spirits, light brownish, much darker above; on posterior surface of body the light color extends upward in irregular clouds on the darker portion, a few round or irregularly shaped spots between and above the cloud-like marks; dorsal blackish, the spinous part with 2 rows of indistinct light spots, the soft part with oblique, wavy, light lines, broader below, growing narrower toward margin of fin; anal, caudal, and pectoral fins plain blackish.

Here described from a specimen 120 mm. long, collected at Misaki. Type No. 7068, Zoological Museum, Stanford University. Cotype No. 50297, U.S.N.M.

Color in life, reddish brown with narrow vertical bands and reticulations of pale green; dorsal suffused with reddish brown; narrow, longitudinal, greenish bands or lines along its upper part.

The following counts are of other specimens:

Dorsal.		Anal.	Pectoral.
Enoshima	XII, 20	I, 19	14
	XII, 20	I, 20	13
Misaki	XIII, 21	I, 19	14
	XII, 21	I, 20	14
	XIII, 21	I, 21	14

This species was taken by us only in the deep rock-pools adjoining the sacred cave of Benten on the island of Enoshima, and in rock-pools of Yogashima, an island at Misaki. In both places it is abundant, feeding on algæ.

(*e-no-shima*, island of the bay.)

12. SCARTICHTHYS STELLIFER Jordan and Snyder, new species.

Head 4$\frac{1}{2}$ in length; depth 4$\frac{1}{2}$; depth of caudal peduncle 9$\frac{1}{2}$ in head; eye 4$\frac{1}{2}$; interorbital space 9; D. XII, 16; A. I, 19; P. 14.

Body elongate; caudal peduncle much compressed; head short, blunt, the anterior profile almost vertical; eye high up and very far forward; suborbital area equal in width to diameter of eye; mouth horizontal, inferior, the upper jaw projecting; cleft of mouth extending to a vertical through posterior border of orbit; teeth long, slender, loosely attached to the fleshy gums, in a single row, close-set like the teeth of a comb; no canines; gill-membranes forming a broad fold across the isthmus; anterior edge of shoulder girdle without protuberances. Pseudobranchiæ large; a row of slender papillæ similar to gillrakers extending along base of pseudobranchiæ downward to attachment of first gill-arch. Gillrakers on first arch small, slender, pointed; nostril with a small, flat, branched cirrus; a pointed, flat cirrus attached on one side to upper part of orbit, on the other to the skin of interorbital area, its height 1$\frac{2}{3}$ in head;.a minute cirrus on each side of posterior part of occiput; no dermal crest on head.

Head and body naked; lateral line complete, arched over the pectoral, a distinct thread-like ridge anteriorly, broken up into separate pores posteriorly.

Dorsal fin extending from nape to caudal peduncle, a deep notch between spinous and soft parts; anterior half of spinous dorsal highest, 1$\frac{3}{4}$ in head; longest dorsal ray 1$\frac{1}{2}$ in head; membrane of dorsal not incised between the rays, the last ray connected with caudal peduncle by membrane; membrane of anal deeply incised between the rays; longest ray 1$\frac{2}{3}$ in head; the first two rays very short; caudal rounded, about equal to head in length; pectoral acutely rounded, the rays simple, the membrane notched on the lower border; ventrals 1$\frac{2}{3}$ in head.

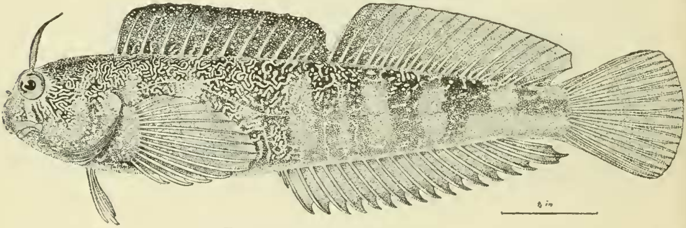

FIG. 10.—SCARTICHTHYS STELLIFER.

Color in spirits, light brown, with 7 more or less distinct cross-bands on side of the body; head and body dotted and penciled with white, subdued on the upper anterior parts, sharp and distinct posteriorly and on throat and breast; spinous dorsal blackish, speckled with white; an oval black spot between first two spines; soft dorsal with white dots and lines, running transversely; anal with a white vertical line on base of fin between each 2 rays, outer part of anal with elongate white spots; caudal dusky, with white specks; pectoral plain. A small specimen has the anal rays tipped with white.

Three specimens of this species were taken in the rock pools at Wakanoura. Type No. 7069, Stanford University Zoological Museum, from Wakanoura. Cotype No. 50298, U.S.N.M.

(*stella*, a star; *fero*, I bear.)

8. AZUMA Jordan and Snyder.

Azuma JORDAN and SNYDER, new genus of Blenniidæ (*emmnion*).

This genus is closely allied to *Bryostemma*, differing chiefly in having the cheeks and upper parts of head covered with fine scales. Body covered with small, smooth scales; lateral line represented by a short row of pores above pectoral; top of head, cheeks, and chin with tentacles; teeth in two closely apposed rows, arranged alternately, the tips meeting on a line so as to form a single cutting edge; dorsal fin of spines only. Coasts of Japan, descending into deep water.

(*Azuma*, a poetical name for the eastern part of the island of Hondo.)

13. AZUMA EMMNION Jordan and Snyder, new species.

Head $6\frac{4}{5}$ in length; depth 5; eye 4 in head; interorbital space $9\frac{1}{2}$; snout $4\frac{1}{2}$; D. 61; P. 14; A. I. 45.

Head small, short, blunt; jaws equal, the lower sometimes projecting slightly; maxillary extending to a vertical through posterior part of pupil; teeth in two closely apposed rows, arranged alternately, the points aligned so as to form a single cutting edge, short, flat, with acutely rounded tips; no teeth on vomer or palatines; tongue thick and blunt; gill membranes united, forming a broad fold across the isthmus; pseudobranchiæ large; a number of papillæ resembling gill rakers extending downward from base of pseudobranchiæ; gill rakers on first arch 6+11, short, thick, pointed.

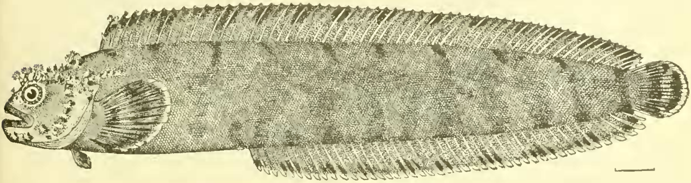

FIG. 11.—AZUMA EMMNION.

Body covered with very small, elongate, cycloid, deeply embedded scales; cheeks, opercles, and upper parts of head with minute scales; membranes of dorsal fin, basal parts of anal, and pectoral with scales; lateral line represented by a short row of pores above pectoral fin, the anterior pores each having a short tentacle; head with numerous cirri, broad and fleshy at the base, pointed or branched at the tip, 2 pairs on interorbital space, the anterior ones longer than the others, united at their bases, the posterior pair separated by a small pointed cirrus; 12 or 14 smaller cirri on occiput; a row of short, branched cirri extending backward along lower jaw and upward on edge of preopercle; 3 or 4 similar ones on opercle near upper edge of gill opening; 2 small barbels on throat; anterior nostrils with large, pointed tubes.

Dorsal inserted above a point half-way between occiput and gill-opening, united posteriorly with the caudal; the spines stiff and pungent, those near middle of fin contained about $2\frac{1}{3}$ times in head; membrane of fin fleshy, not incised between the spines; two anterior spines with short, branched cirri; anal united with caudal; the longest or posterior rays $2\frac{1}{3}$ in head; the membrane deeply incised between the rays; caudal rounded, the rays of the lower half slightly longer than those of the upper: length of fin $1\frac{1}{2}$ in head; pectoral rounded, $1\frac{1}{6}$ in head; ventrals somewhat longer than diameter of eye.

Body clouded with brownish black; 10 blackish spots as large as eye along upper part of body joined to vertical, dark bands on the dorsal; 11 or 12 indistinct, broad, vertical bands on lower half of body, 10 of which are above the anal and encroach on the fin, forming distinct, blackish blotches; caudal with 2 broad, vertical, blackish bands, the interspaces and the posterior border of fin white; pectoral clouded with blackish, the edge white; ventrals blackish, edged with white; head mottled, the chin and throat white.

Described from type, No. 7137, Ichthyological collections, Stanford University, a specimen about 250 mm. long from Hakodate. The cotype in the National Museum is numbered 50280. Other specimens measure 400 mm.

Collected at Same, Hakodate and Miyako, the specimen from Miyako presented by Mitonubu Irako, director of the Museum of Morioka.

Dorsal spines.	Anal rays.	Locality.
60	45	Same.
60	45	Hakodate.
61	45	Do.
61	45	Do.
60	45	Miyako.

(έν, in: *μνίον*, moss.)

9. BRYOSTEMMA Jordan and Starks.

Bryostemma Jordan and Starks, Proc. Cal. Ac. Sci., 1895, p. 841 (*polyactocephalum*).

Body moderately elongate, covered with small scales; head naked; snout short; no teeth on vomer or palatines; teeth in jaws arranged alternately in 2 closely apposed series, the points aligned to form a single cutting edge; gill-membranes united, free from the isthmus; nostrils, orbital region and neck with dermal flaps, the supraorbital flaps high; dorsal fin long, of spines only; pectorals well developed, more than half length of head; ventrals well developed, jugular; caudal fin distinct; no air-bladder; pyloric cæca present; no true lateral line; a short series of large pores above pectoral. North Pacific, representing *Chirolophis* of the Atlantic. This genus differs from the European genus, *Chirolophis* Swainson (*Blenniops* Nilsson), in the absence of a true lateral line. Dr. Boulenger informs us that a true median lateral line is developed in *Chirolophis ascanii.*

(βρύον, moss; στέμμα, crown.)

a. Anal rays, I. 45.
  b. Body with diffuse spots. Dorsal LIX ………………… *polyactocephalum*, 14.
  bb. Body brightly colored, with 10 or 11 dark bars; fins barred; dorsal, LXI; anal, I. 45……………………………………………… *otohime*, 15.
aa. Anal rays I. 36; body speckled; dorsal LI……………………… *saitone*, 16.

14. BRYOSTEMMA POLYACTOCEPHALUM (Pallas).

Blennius polyactocephalus Pallas, Zool. Rosso-Asiat., III, 1811, p. 179; Kamchatka.

Chirolophus japonicus Herzenstein, Mélanges Biologiques, XIII, 1890, p. 123; Hakodate.

Bryostemma polyactocephalum Jordan and Gilbert, Rept. Fur-Seal Investigations, Pt. 3, p. 479 (in part.)

Head 6¾ in length; depth 4⅔; depth of caudal peduncle 2⅗ in head; eye 3¾; snout 4; D. LIX; A. I. 45.

Body long, compressed, deep; head short, the snout blunt; interorbital space concave, the eyes projecting above the top of head; lower jaw projecting somewhat; maxillary extending to a vertical passing through middle of eye. Jaws with 2 closely apposed rows of teeth, arranged alternately, the tips aligned to form a single cutting edge; vomer and palatines naked; pseudobranchiæ large; gill-rakers on first arch 18, short, pointed.

Head naked; body covered with minute, partly embedded scales; membranes of fins naked, except basal part of pectoral. Lateral line represented by a series of 7 or 8 pores above opening of pectoral fin. Head with cirri; a small flat one between and a little posterior to the nostrils; 2 pairs of branched tentacles on interorbital space, the anterior of which are joined at their bases, the posterior ones widely separated, higher than the anterior pair; occiput with many small cirri, some of which are branched, others simple; lower jaw with a row of small, widely spaced cirri, which extends backward and upward along edge of preopercle; a few cirri above the short lateral line. Nostrils with long, pointed tubes.

Dorsal inserted immediately above the gill-opening, the first spine separated from the others by a deep scallop, several small cirri along sides of spine; the first and second spines with broad, branched flaps on their tips; membrane of fin not incised between the spines, connected with basal part of the caudal; height of middle spines contained 2⅖ times in head. Membrane of anal deeply incised between the rays, narrowly connected with the base of caudal; rays near middle of fin contained 2½ times in head; caudal rounded, the rays below the middle slightly longer than those above, 2½ in head; pectoral rounded, equal in length to the head; ventrals 2½ in head.

Color, brownish, throat and chin light yellowish; dorsal and anal dark toward the edge, the anal rays tipped with whitish; an indistinct, dark spot on posterior end of dorsal, extending downward on the body; caudal with 3 indistinct, vertical, dark bands; pectoral narrowly edged with soiled white.

Described from a specimen about 240 mm. long from Petropaulski Harbor, Alaska. Not seen by us in Japan though recorded by Herzenstein from Hakodate. The species is abundant on the west side of Bering Sea. The specimens from Alaska referred to this species belong to others as yet undescribed.

(*πολύς*, many; *ἄκτις*, ray; *κεφαλή*, head.)

15. BRYOSTEMMA OTOHIME Jordan and Snyder, new species.

Head $5\frac{2}{3}$ in length; depth $5\frac{2}{5}$; depth of caudal peduncle 3 in head; eye $3\frac{1}{2}$; interorbital space $6\frac{1}{2}$; snout $3\frac{3}{4}$; D. 61; A. I, 45; P. 15.

Body deep, generally compressed, lower jaw projecting slightly beyond the upper; maxillary extending to a point below posterior part of pupil; teeth of jaws in 2 rows anteriorly, in a single row on posterior part of jaws, arranged alternately, the points aligned to form a single cutting edge; no teeth on vomer and palatines; tongue broad and rounded; gill-membranes forming a fold across the isthmus; pseudobranchiæ large, the filaments as long as those of the gills; a row of cirri resembling gillrakers along their base; gillrakers on first arch about 4 + 11, short, pointed; pyloric cæca present.

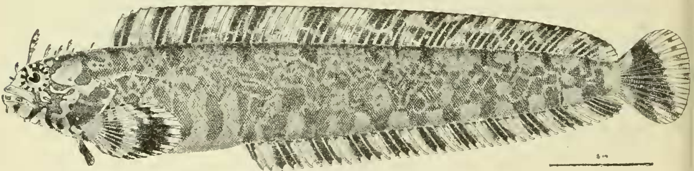

FIG. 12.—BRYOSTEMMA OTOHIME.

Body covered with minute, close-set, cycloid scales; head naked. A small, median cirrus on upper part of snout; 2 pairs on interorbital space, the anterior of which are joined at the base, tall, slender, branched; those of occiput and nape small, slender; a small pair on chin, another on side of throat posterior to these; lateral line represented by a short row of pores above pectoral fin, the pores not extending back as far as tip of fin.

Dorsal inserted above gill-opening, connected with the base of caudal posteriorly, formed of spines throughout, the highest or anterior ones $2\frac{1}{4}$ in head, tips of anterior 4 or 5 rays free, with cirri; the membrane not incised between the rays; anal low, the rays scarcely longer than diameter of eye; the membrane deeply incised between rays;

membranes of dorsal and anal without scales; caudal bluntly rounded, its length, 1⅓ in head; pectoral rounded, the membrane incised between the rays, 1⅛ in head; ventrals, 3 in head.

Dorsal part of body with 10 or 11 narrow, vertical bars, corresponding in position with an equal number of large, dark blotches on the dorsal fin; ventral part of body with 10 broad, vertical bars, corresponding with as many large black spots on the anal; the ventral bars separated by white spots which alternate in position with a row of similar spots near middle of body, these in turn separating dark bars, the downward projections of the dusky color of the dorsal parts; head barred and mottled with brownish black, a distinct, dark bar extending downward from eye; cirri with small cross-bars; caudal with a large median black blotch, the base and edge white; pectoral clouded with dusky, edged with white; ventrals dusky, edged with white.

Described from a specimen 82 mm. long. Type, No. 7073, Stanford University Zoological Museum, from Hakodate. Many other examples from the same locality show some variation in brightness of color, the pattern being the same. Some of these cotypes are numbered 50302 in the United States National Museum.

Five specimens show a variation of from 60 to 62 dorsal spines and 45 to 46 anal rays.

(*Otohime*, a princess of Japanese fishes.)

16. BRYOSTEMMA SAITONE Jordan and Snyder, new species.

Head 5½ in length; depth 5¾; depth of caudal peduncle 3½ in head; eye 3⅔; interorbital space 10; snout 4½; D. 51 (?); A. I, 36.

Eyes large, placed far forward; snout short, the suborbital space narrow; lower jaw slightly longer than the upper; maxillary extending to a point below pupil; teeth small, close set, in two rows anteriorly, the teeth alternating in position, the tips aligned so as to form a single cutting edge; no teeth on vomer or palatines; pseudobranchiæ present; gillrakers short, pointed; gill-membranes forming a fold across the isthmus; head naked; body covered with minute, cycloid scales. Lateral line represented by a short series of pores above anterior part of pectoral fin; a row of large mucous tubes below eye, passing backward above cheek to upper edge of gill opening; anterior nostril with a long tube; interorbital space, occipital part of head, and nape with long, branched tentacles, the length of the highest, which is above orbit, slightly greater than the diameter of eye. Dorsal inserted above gill opening, composed of rather strong, curved spines, the longest 2¼ in head; both dorsal and anal probably connected with caudal; ventrals jugular, 3 in head.

The only specimen which we have of this species is in such a poor state of preservation that accurate statements concerning the lateral line, the extent of the scaly covering, the tentacles of the head, the shape and character of the fins, and points of less importance can not be made; the caudal fin is entirely gone.

Color, pale olive, with small, indistinct, brownish spots; a row of dark brown spots about the size of eye along body at base of dorsal, a row of smaller ones along middle of body, and a similar row along base of anal, the latter extending outward to the fin; belly plain; a dark spot extending downward from eye.

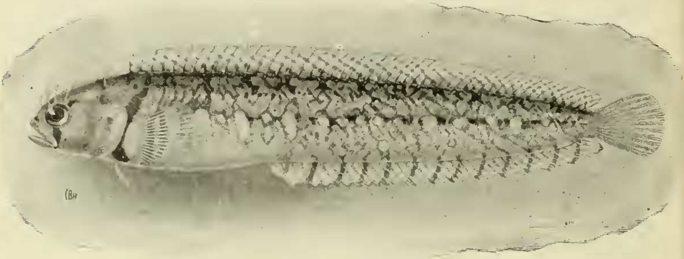

FIG. 13.—BRYOSTEMMA SAITONE.

The species may be distinguished from *B. otohime* by the more subdued coloring of the body, and the shorter anal fin, this fin in the latter species having 45 rays.

We have one specimen, 95 mm. long, from Aomori, presented by Mr. Sotaro Saito, director of the Museum of Aomori, for whom the species is named.

Type.—No. 7072, Stanford Zoological Museum.

10. ENEDRIAS Jordan and Gilbert.

Enedrias JORDAN and GILBERT, in Jordan and Evermann, Fishes North and Mid. Amer., III, 2414, 1898 (*nebulosus*).

This genus differs from *Pholis* in the scaly head.

(ἐνέδρα, lurking place.)

17. ENEDRIAS NEBULOSUS (Schlegel).

GINPO (SILVER TAIL).

Gunnellus nebulosus SCHLEGEL, Fauna Japonica, Poiss., p. 138, 1846, pl. LXXIII, fig. 2; Bay of Mogi, near Nagasaki.

Centronotus nebulosus STEINDACHNER, Ichth. Beitr., IX, 1880, p. 24; Gulf of Strielok, near Vladivostok.—NYSTROM, Svensk. Vet. Handl., 1887, p. 37; Nagasaki.—ISHIKAWA, Prel. Cat., 1897, p. 35; Tokio, Hokkaido.

Murænoides nebulosus, STEINDACHNER, Reise II. M. S. Aurora, 1898, p. 213; Kobe.

Enedrias nebulosus, JORDAN and GILBERT, Rept. Fur Seal Invest., 1898, p. 482; Hakodate, Tokyo.—JORDAN and EVERMANN, Fish. N. and M. Am., III, p. 2414; Hakodate.

Centronotus crassispina[1] SCHLEGEL, Fauna Japonica, Poiss., 1846, p. 139; Nagasaki.
Centronotus subfrenatus GILL, Proc. Ac. Nat. Sci. Phila., 1859, p. 146; Shimoda.

Head $8\frac{4}{5}$ in length; depth $6\frac{2}{3}$; depth of caudal peduncle 3 in head; eye $5\frac{2}{3}$; snout $5\frac{1}{2}$; interorbital space 10; D. LXXXI; A. II, 39; P. 15.

Head very small; body elongate, greatly compressed posteriorly; eye rather low in head, the interorbital space greatly arched; lower jaw projecting slightly beyond the upper, maxilliary extending to a vertical through anterior edge of orbit; teeth short, blunt, in narrow bands on both jaws, more numerous on the upper, a few minute teeth on the vomer; gillrakers 2+10, slender, pointed.

No lateral lines; body covered with minute cycloid scales, which grow outward on membranes of dorsal and anal fins; head completely covered with similar scales except on interorbital space; no tentacles on head; nostrils with small tubes; dorsal with short, rigid, pungent spines, the first ones scarcely longer than diameter of pupil, the posterior ones 4 in head; anal with 2 strong spines, the longest rays $3\frac{1}{2}$ in head; membrane of fin slightly scalloped between the rays, connected with the base of caudal, as is also that of the dorsal; caudal rounded, $1\frac{1}{2}$ in head; pectoral narrow, rounded, $2\frac{1}{8}$ in head; ventrals very small, the spines prominent, equal in length to first spine of dorsal.

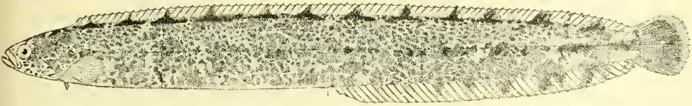

FIG. 14.—ENEDRIAS NEBULOSUS.

Color, variously mottled or blotched with brownish or blackish on a yellowish-olive background; upper third of body having the color darker than the lower parts; a dark stripe extending downward from eye and upward over interorbital area; dorsal and anal blotched like the body.

Color in life, body mottled with olive-brown, more or less flushed with yellowish; belly orange, often very bright; head yellowish-brown and black; dorsal edged with dull crimson; pectoral and lower half of anal scarlet; caudal dull orange.

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[1] The following is the substance of Schlegel's account of *crassispina*, a form which we can not separate from *nebulosus*.

D. LXXVIII; A. II, 40.

Body greatly compressed, the greatest depth in the region of the anal opening, contained 8 times in the length; head 9 in length; teeth numerous; scales minute, delicate, deeply imbedded; dorsal composed of strong spines, somewhat curved, beginning above the pectorals, extending to caudal; the anal begins below the forty-first spine of the dorsal and extends to the caudal; caudal resembling that of *E. nebulosus*, except that it is a little larger; pectorals also similar to those of that species.

Color in spirits, uniform pale reddish brown, darker along the base of the dorsal; fins bordered with yellowish. (Schlegel.)

This species differs from *E. nebulosus*, according to Schlegel, in having a smaller head, larger eyes, more strongly curved spines, and a lighter color.

Northern Japan; abundant in all the bays of Hondo and Hokkaido. Our numerous specimens are from Hakodate, Aomori, Otaru, Matsushima, Tokyo, Misaki, and Onomichi.

(*nebulous*, clouded.)

11. PHOLIS (Gronow) Scopoli.

Pholis Gronow, Zoophylaceum, 1765, p. 78 (not binomial).
Pholis Scopoli, Introd. Hist. Nat., 1777, p. 456 (*gunnellus*).
Muraenoides Lacépède, Hist. Nat. Poiss., II, 1800, p. 324 (*sujef*).
Centronotus Bloch and Schneider, Syst. Ichth., 1801, p. 165 (*fasciatus*).
Dactyleptus Rafinesque, Anal. de la Nature, 1815, p. 82; substitute for *Muræноides*.
Centronotus Cuvier, Règne Animal, 2d ed., II, 1829, p. 239 (*gunnellus*).
Ophisomus Swainson, Nat. Hist. Class'n Anim., II, 1839, p. 277 (*gunnellus*).
Urocentrus Kner, Sitzber. k. Akad. Wissen. Wien, LVIII, 1868, p. 51 (*pictus*).
Rhodymenichthys Jordan and Evermann, Check-List Fishes, 1896, p. 474 (*ruberrimus*=*dolichogaster*).

Body long and low, considerably compressed, somewhat band-shaped, the tail slowly tapering; head small, compressed, naked; mouth rather small, oblique; jaws with rather small teeth in narrow bands or single series; vomer and palatines usually toothless; gill-membranes broadly united, free from the isthmus; scales very small, smooth; no lateral line; dorsal fin long and low, beginning near the head, composed entirely of stiff, sharp, subequal spines; anal similar in form, of 2 spines and many soft rays; caudal fin short and small, more or less joined to dorsal and anal; pectorals rather shorter than head; ventrals very small, of 1 spine and a rudimentary ray; intestinal canal short, without cæca.

Shore fishes of the Northern seas. (φωλίς, name of some fish said to shelter itself when lying in wait by producing a cloud of mucus; φωλάς, one who lies in wait.)

a. *Urocentrus:* Pectoral fin small, 3½ to 4 times in length of head; dorsal spines about 93; anal rays, 48; body with 2 rows of dark blotches; fins nearly plain .... *pictus*, 18.
aa. Pectoral fin moderate, 2 to 2½ times in length of head.
  b. *Rhodymenichthys:* Dorsal and anal joined to the caudal to the full height of the spines, without constriction at base of caudal; body greatly compressed, ribbon-like.
    c. Dorsal spines about 93; anal about 47; pectoral short, 2⅔ in head, color red; no ocelli along base of dorsal .... *dolichogaster*, 19.
    cc. Dorsal spines 82; anal II, 45; pectoral 3 in head. Color, grayish, a yellow streak from eye to axis .... *taczanowskii*, 20.
  bb. Pholis: Dorsal and anal slightly connected with caudal, leaving a constriction of outline at base of caudal; body less compressed; dorsal fin with dark blotches or ocelli.
    c. Pectoral well developed, about one-half length of head. Dorsal spines about 88; anal rays about 42; pectoral 2⅓ in head; dorsal fin with dark quadrate blotches rather than ocelli; sides scarlet in adult, bounded with black .... *fasciatus*, 21.

18. PHOLIS PICTUS (Kner).

Urocentrus pictus KNER, Sitzungsb. Denkshr. Akad. Wissensch., LVIII, 1868, p. 51, pl. VII, fig. 21; Singapore; an error, probably from Decastris Bay.

Centronotus pictus STEINDACHNER, Ichth. Beiträge, IX, 1880, p. 25.

Pholis pictus JORDAN and GILBERT, Rept. Fur Seal Invest., 1898, p. 383; Shana Bay, Iturup Island.—JORDAN and EVERMANN, Fish. N. and M. Am., III, p. 2415; Iturup.

Head 9½ to 10½; depth 8 to 10 D. XCIII or XCIV; A. II, 46 to 48. Eye as long as snout; mouth oblique, the upper jaw the longer, reaching to front of eye; pectoral very short, scarcely longer than eye, 3 to 4 in head; anal said to have an isolated channeled spine hidden in the skin, but our specimens show no peculiar structure. Color, yellowish, with 2 lengthwise series of large oblong blackish blotches, the one along base of dorsal, but not on the fin, of 21 or 22 blotches, the other on lower part of sides, of about 25; a series of fainter blotches along base of anal; in other specimens the lower row becomes obscure, the upper more distinct, and the series above anal disappears; a black bar downward from eye, a whitish band behind it; opercles dusky. Ochotsk Sea; our specimens from Shana Bay, Iturup Island, Kuril Group, not seen elsewhere in Japan.

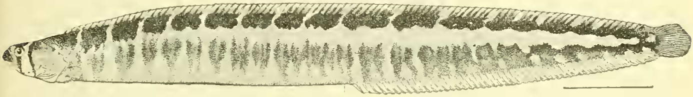

FIG. 15.—PHOLIS PICTUS.

As already shown by Steindachner, this is a typical *Pholis*, Kner having been in error in ascribing to it an isolated and channeled first anal spine. The ventral spines are bound down by the integument more closely than usual, but they are in other respects not peculiar. Each is accompanied by 2 short rays concealed in the membrane, and difficult to detect. The latter are stiff and pungent and seem not to be articulated. The ventrals of *P. ornatus* show the same structure. Kner gives the anal formula as II, 40. This must be a misprint for II, 49, as the artist figures 51 rays in the fin, not differentiating the 2 anterior ones.

(*pictus*, painted.)

19. PHOLIS DOLICHOGASTER (Pallas).

Blennius dolichogaster PALLAS, Zoogr. Rosso-Asiat., III, 1811, p. 175; Kamchatka. (Type in Mus. Berlin.)

Gunellus dolichogaster CUVIER and VALENCIENNES, Hist. Nat. Poiss., XI, 1836, p. 436.—BREVOORT, Exped. Japan, 1856, p. 270, pl. VII, fig. 2; Hakodate.

Centronotus dolichogaster GÜNTHER, Cat., 1861, p. 288.—STEINDACHNER, Sitzb. Ak. Wis. Wien, 1870, p. 22; Decastris Bay.

Muræenoides dolichogaster JORDAN and GILBERT, Synopsis, 1883, p. 768.

Pholis dolichogaster Jordan and Gilbert, Rept. Fur Seal Invest., 1898, p. 383—Jordan and Evermann, Fish. N. and M. Amer., III, p. 2416; Robben, Bering, and Medni islands, and Kigiktowik Bay.

Gunnellus ruberrimus Cuvier and Valenciennes, Hist. Nat. Poiss., XIV, 1839, p. 440; Kuril Islands; after notes of Pallas, Zoogr. Rosso-Asiat., III, 1811, p. 178.

Muraenoides ruberrimus Bean in Nelson, Rept. Coll. Alaska, 1887, p. 305, pl. XIV, fig. 1.

Rhodymenichthys ruberrimus Jordan and Evermann, Check-List Fishes, 1896, p. 474.

Pholis ruberrimus Bean and Bean, Proc. U. S. Nat. Mus., 1896, p. 248; Bering and Medni islands.—Bean and Bean, Proc. U. S. Nat. Mus., 1897, p. 389; Mororan.

Head $9\frac{4}{5}$ in length; depth 8; D. XCII; A. II, 44; P. 14; eye 5 in head; maxillary $2\frac{3}{4}$; pectoral $2\frac{1}{2}$; caudal 2; ventral spines $1\frac{3}{5}$ in eye. Body elongate, much compressed; head small, its upper profile convex; mouth moderate, very oblique, the maxillary reaching to below middle of eye; teeth rather large and blunt, arranged in a single row, the anterior one not enlarged; interorbital space narrow, without a sharp ridge, its width less than eye; snout equal in length to eye; distance from tip of snout to occiput $1\frac{5}{6}$ in head; head entirely naked; body covered with small, cycloid, inconspicuous scales; origin of dorsal over upper end of gill-slit, its distance from nape equal to distance from nape to front of eye, the spines toward the anterior end of fin the highest; origin of anal a little nearer tip of caudal than snout; dorsal and anal confluent with caudal, the anal more broadly connected than dorsal; pectoral small, rounded behind; ventral spines inserted directly under base of pectorals, their length little greater than their distance apart; caudal short and broad, well rounded in outline.

Bering Sea; recorded from the Kuriles and from Robben, Medni, and Bering islands, and from Kigiktowik Bay; not taken by us in Japan. The specimen above described was taken at Robben Island by Capt. J. G. Blair, then in command of the guard-ship *Leon*. It is 9 inches long and is uniform red in color, with a few pale dots. Another specimen, 18 cm. long, taken by Mr. Gerald E. H. Barrett-Hamilton at Bering Island, shows the following characters: The color is cherry red on the body and fins, lighter on belly, lower half of cheek and under side of head; lips blackish anteriorly, a narrow black streak running from them along snout to eye and from eye across cheek and opercles toward upper edge of pectoral base; this line separates the deep red upper part of the head from the lighter area below; sides of body with a number of minute scattered black spots; along middle of side is a distant series of light spots as large as the pupil, the margin of each with 2 to 4 black specks like those scattered over sides. The dorsal and anal more widely joined to the caudal than in other species, the fins being higher posteriorly and without perceptible notch. The dorsal contains 93 spines, the anal 2 spines and 47 rays, the pectorals 15 rays. Head 9½ in length; depth 7⅚; eye 5 in head; maxillary 3¾; pectorals 2½; caudal 2⅓; ventral spine 2⅕ in eye.

(*δολιχός*, long; *γαστήρ*, belly.)

20. PHOLIS TACZANOWSKII (Steindachner).

Centronotus taczanowskii STEINDACHNER, Ichth. Breitr., IX, 1880, p. 24, pl. III, fig. 1; Gulf of Strielok, Okhotsk Sea. (Coll. Professor Dybowski.)

Pholis taczanowskii JORDAN and EVERMANN, Fish N. and M. Amer., III, p. 2416; copied.

Head 8⅔ in length; depth 7⅖; depth of caudal peduncle 5¼ in head; eye 4¼; snout 4⅔; interorbital space 7; D. LXXXII; A. II, 45.

Head small; interorbital space narrow, arched; jaws about equal; mouth oblique; teeth in narrow bands on anterior parts of jaws, short, heavy, the tips bluntly rounded; 3 or 4 small teeth on vomer; gill-rakers 3 + 7, short, slender, pointed; head naked, no filaments; no lateral line; scales of body minute, cycloid, deeply embedded; no scales on membrane of dorsal or anal. Dorsal inserted above base of pectorals, composed of strong, curved spines, the longest or posterior ones contained about 4½ times in head; membrane of fin thick, not incised between the spines; anal inserted below thirty-seventh dorsal spine, the spines similar in shape and size to those of the dorsal directly above; the rays somewhat shorter than the spines of the dorsal, the membrane thick, not incised between the rays; caudal rounded, 2 in head; pectoral rounded, 2½ in head; ventrals minute, the spines strong.

Color in alcohol brownish-yellow, a mere trace of a dark line passing backward from tip of snout through eye, the head light in color below the line.

This description is of specimens about 120 mm. long. Smaller specimens, about half that length, always have the ocular line very distinct, sharply dividing the upper, somewhat dusky coloring of the head from the lower, much lighter part. Many small individuals are strikingly mottled with dusky, there usually being a series of small vertical bars on the dorsal and anal and a row of round light spots along the sides. All degrees of coloration from the extensively mottled to the plainly colored may be found among the young, the ocular line always being present. This species is extremely abundant at Hakodate, living in the kelp and among the rocks along the shore.

(Named for Professor Taczanowsky.)

21. PHOLIS FASCIATUS (Bloch and Schneider).

Centronotus fasciatus BLOCH and SCHNEIDER, Syst. Ichth., 1801, p. 165, pl. XXXVII, fig. 1; Tranquebar (an error).—GÜNTHER, Cat., III, 1861, p. 287.

Gunnellus grœnlandicus CUVIER and VALENCIENNES, Hist. Nat. Poiss., XI, 1836, p. 442, Greenland; after Bloch and Schneider.—REINHARDT, Dansk. Vidensk. Selsk. Nat. og Mathem. Afh., VII, 1838, p. 122.

Gunnellus murænoides VALENCIENNES in Cuvier, Règne Animal, Poiss., p. 916; pl. LXXVIII, fig. 2; after Bloch and Schneider.

Blennius tænia PALLAS, Zoogr. Rosso-Asiat., III, 1811, p. 178; Kuril Islands.

Pholis tænia BEAN and BEAN, Proc. U. S. Nat. Mus., 1897, p. 308; Petropaulsky.

Murænoides maxillaris BEAN, Proc. U. S. Nat. Mus., 1881, p. 147; St. Paul Island, Alaska. (Type, No. 23999. Coll. Henry W. Elliott.)—JORDAN and GILBERT, Synopsis, 1883, p. 768.

Gunnellus fasciatus CUVIER and VALENCIENNES, Hist. Nat. Poiss., XI, 1836, p. 441.

Murænoides fasciatus JORDAN and GILBERT, Synopsis, 1883, p. 767.

Murænoides tænia JORDAN and GILBERT, Synopsis, 1883, p. 766.

Pholis fasciatus GILBERT, Rept. Fish Comm., 1893, p. 449.—JORDAN and GILBERT, Rept. Fur Seal Invest., 1898, p. 480.

Head 8 to 9½; depth 7 to 9; D. LXXXIV to LXXXIX; A. II, 42 to 44; V. I, 1.

Head scaleless; mouth decidedly oblique, the tip of lower jaw on a level with middle of eye; teeth short, blunt, in narrow bands on jaws; 3 or 4 teeth on the vomer; eye equal to snout, a little more than interorbital width; ventral spine ⅔ eye, ½ length of mandible; caudal ½ head; pectoral 2¼ in head; vertical fins slightly joined at base.

Ground color, yellowish-gray in life, the sides of a brilliant scarlet; base of dorsal occupied by 10 or 11 oblong blotches of dark brown, which extend to the tips of the fins; these blotches each divided on the fin by a median spot of the ground-color, the areas of the ground-color alternating with these blotches finely speckled with brown, a large spot of brown usually occupying a median position upon the fin; middle and lower part of side occupied by vermiculating brown lines on the ground-color, these vermiculations arranged in more or less distinct cross-bars, about 20 in number, reaching to or nearly to the midventral line, the posterior ones often continued on to the anal fin; pectoral and caudal fins yellow, unmarked; a brown blotch across snout and tip of mandible, followed by a narrow yellowish bar descending to front of eye; interorbital space crossed by a broad brown bar with blackish margins, which become much narrower below and traverse the eye and the cheek; behind this a broader yellow bar margined behind with a narrow brown line.

In life, the coloration is extremely brilliant, the pale markings being bright orange or scarlet.

Bering Sea and Arctic Ocean, from Greenland to the Kurils, locally abundant; numerous fine, large specimens taken from the stomachs of cormorants on St. Paul Island, Pribilof group; others dredged in shallow waters. Two specimens, each about 90 mm. long, were taken at Aomori. We have still others from Bristol Bay and Upernavik, Greenland. In the museum at Hakodate is a specimen of some other species of *Pholis*, from Nemuro, with 105 dorsal spines and 25 dark crossbands.

(*fasciatus*, banded.)

12. GUNNELLOPS Bleeker.

Gunnellops BLEEKER, Versl. Ak. Amst., (2), VIII, 1874, p. 368 (*roseus*).

This genus is apparently distinguished from *Pholis* by the tapering tail, around which the vertical fins are confluent; palatine teeth present.

(*gunnellus*, gunnel, gunwale, an old name of the European *Pholis gunnellus;* ὤψ, appearance.)

22. GUNNELLOPS ROSEA (Pallas).

Blennius roseus PALLAS, Zoogr. Rosso-Asiat., III, 1811, p. 177, Kuril Islands.
Centronotus roseus GUNTHER, Cat., III, 1861, p. 290.
Gunnellops roseus JORDAN and EVERMANN, Check-List Fishes N. and M. Am., 1896, p. 474; Fishes N. and M. Am., III, p. 2420.

D. 100; A. 90; P. 9; V. I. Head obtuse, the lower jaw projecting; eyes large; body very long, compressed, tapering into a slender tail; pectoral small, ovate, hyaline; 2 spines in place of ventrals; dorsal extending from the nape to the end of the tail; anal joined to caudal. Color intensely red. Kuril Islands. (Pallas.) Not seen by any recent collector.

(*roseus*, rosy.)

13. ALECTRIAS Jordan and Evermann.

Alectrias JORDAN and EVERMANN, Fishes N. and M. Am., III, p. 2869 (*alectrolophus*).

Body elongated, compressed, covered with very small, embedded scales which are obsolete or concealed anteriorly; lateral line obsolete. Head small, compressed, with fleshy crest above; eyes small; mouth oblique; teeth in each jaw in a narrow band, the outer somewhat enlarged; narrow bands of teeth on vomer and palatines; gill-membranes narrowly attached to the isthmus; sometimes with a free fold behind; branchiostegals 5. Dorsal fin not very low; anal spine; ventrals wanting; caudal fin small, entire; pectoral fins moderate or small; pyloric cæca present, few. Pacific Ocean; differing from the more southern genus *Anoplarchus* in having the gill-membranes narrowly joined to the isthmus, leaving a free fold behind.

(*ἀλέκτωρ*, a cock, from the crested head.)

23. ALECTRIAS BENJAMINI Jordan and Snyder, new species.

Head $5\frac{4}{5}$ in length; depth $5\frac{4}{5}$; depth of caudal peduncle 4 in head; eye 5; interorbital space $9\frac{1}{2}$; snout 4; D. LV; A. I, 41.

Depth equal to length of head measured to edge of opercle; head large; mouth oblique; the maxillary extending to a vertical passing through posterior edge of orbit; jaws equal; eyes directed somewhat obliquely; interorbital area arched; teeth small, sharp, in narrow bands on jaws, the outer ones enlarged; vomer and palatines with narrow bands of minute teeth; gill-membranes narrowly attached to the isthmus, united forming a fold across it; gillrakers on first arch about

12, represented by mere elevations; pseudobranchiæ large; head with a conspicuous crest, extending along median line from tip of snout to nape, highest on occiput, its greatest elevation somewhat less than diameter of orbit.

Head naked, without filaments; scales on body posterior to region of anal opening minute, smooth, deeply imbedded; no scales on membranes of fins; no lateral line.

Dorsal inserted above base of pectorals, connected with the caudal posteriorly, no incision separating them; membrane of fin thick, fleshy, concealing the spines, not incised between their tips; spines strong, curved, pungent, those near middle of posterior half of fin longest, $3\frac{3}{5}$ in head; anal inserted below base of fifteenth or sixteenth spine of dorsal; the spine minute, concealed; membrane of fin fleshy, concealing the rays, not incised on its edge, connected with the caudal, the longest rays equal to length of snout; caudal rounded, 2 in head; pectoral rounded, $2\frac{1}{2}$ in head; no ventrals.

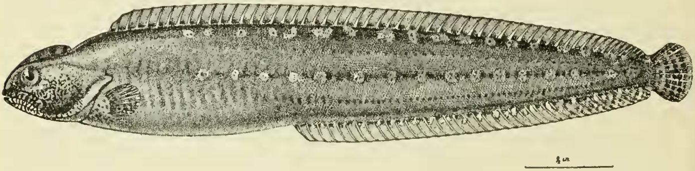

FIG. 16.—ALECTRIAS BENJAMINI.

Color in spirits yellowish-olive, darker above than below; a row of whitish spots, larger than orbit, on body along back of dorsal, the spaces between the spots darker than other parts of the body, the spots themselves speckled with black; a similar row of spots along middle of side; an indistinct dark line extending backward and downward from eye; cheeks, chin, and throat speckled and finely mottled with blackish; crest with 4 dark vertical bars; anal with whitish spots bordered with blackish; caudal with indistinctly outlined vertical light and dark bars; pectoral light, with a few dusky lines.

Described from a specimen 95 mm. long. Considerable variation in color is shown, some being very dark and almost entirely unmarked, some dark, with the lighter marking showing conspicuously, others light, with an indistinct lateral band more or less broken; in all, the marking on the chin and throat persists more or less plainly. The length of the maxillary is slightly shorter in some individuals than in others, occasionally not extending much beyond the pupil.

Dorsal spines.	Anal rays.
57	38
58	42
55	41
58	40

The species differs from *A. alectrolophus* in having a longer head, deeper body, fewer dorsal spines, fewer anal rays, a longer maxillary, and in having the chin and throat peculiarly marked. We have secured many specimens from Hakodate.

Type, No. 7074, Leland Stanford Junior University Mus. Cotype, No. 50295, U.S.N.M.

(Named for Dr. Marcus Benjamin, editor of the Proceedings of the United States National Museum.)

14. EULOPHIAS Smith.

Eulophias H. M. SMITH, Bull. U. S. Fish Comm., 1901 (March 28, 1902), p. 93 (*tanneri*).

Body very elongate; dorsal fin low, extending entire length of body and consisting of numerous rigid spines succeeded by a few simple rays; anal fin long and low, composed of one spine and numerous simple soft rays; caudal fin small but distinct, blended with the dorsal and anal; pectoral fins short and pointed; ventral fins absent; scales absent; no lateral line; gill-membranes broadly united, free from the isthmus; nostrils tubular; ventral opening in advance of middle of body.

(*εὖ*, well; *λοφίας*, one having a bristly back, in allusion to the very long spinous dorsal fin.)

24. EULOPHIAS TANNERI H. M. Smith.

Eulophias tanneri H. M. SMITH, Bull. U. S. Fish Comm., 1901 (March 28, 1902), p. 94, Suruga Bay, Japan, at U. S. Fish Commission steamer *Albatross* Sta. 3715, in about 67 fathoms, May 11, 1900.

Type.—No. 49798, U.S.N.M.

Body elongate, eel-like, cylindrical anteriorly, compressed posteriorly; tapering gently backward and terminating in a blunt point; greatest depth about 0.05 total body length; head rather long, conical, not larger than body, its length 0.12 body length, terminating posteriorly in a rounded flap; eye large, directed slightly upward, rather less than 0.33 length of head; interorbital space contracted, not wider than pupil; snout short, rounded, 0.5 length of eye; mouth rather large, terminal slightly oblique, jaws equal, maxillary extending to vertical of anterior edge of pupil; nostrils tubular, midway from eye to end of snout; gill membranes broadly united, not attached to isthmus; anal orifice 0.4 distance from snout to end of body; dorsal fin low, continuous, beginning slightly in advance of posterior edge of opercle and extending to caudal fin, gradually increasing in height from before backward; composed of 121 stiff spines and 13 simple soft rays; anal fin long and low, beginning under thirty-sixth dorsal spine and extending to caudal; consists of 1 spine and about 75 simple rays, the length of the spine being about twice that of the adjoining rays; caudal fin blended with dorsal and anal, composed of 7 simple rays; pectoral fins short, pointed, and narrow, less than half length of head. Length of specimen, 45 mm.

Underparts whitish; a series of brownish elongated blotches about 20 in number, extending along side from head to tail; above these a series of smaller blotches of same color, about twice as numerous; a dark-brown stripe, less than width of eye, extending behind eye; a blackish blotch on cheek beneath eye, extending anteriorly and posteriorly on the branchiostegal membrane; gill membrane with dark-brown area; fins unmarked.

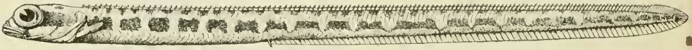

FIG. 17.—EULOPHIAS TANNERI.

"This interesting species is named for Commander Z. L. Tanner, U. S. N., commander of the United States Fish Commission steamers *Albatross* and *Fish Hawk* from 1879 to 1894, the foremost exponent of the methods of modern deep-sea exploration, whose intelligent and zealous investigations have led to most valuable contributions to oceanic biology and physics." (Smith.)

15. NEOZOARCES Steindachner.

Neozoarces STEINDACHNER, Ich. Beitr., IX, 1880, p. 26 (*pulcher*).

Body elongate, compressed, pointed behind the dorsal and anal, united around the tail; dorsal rays very numerous, low, the spinous part lower and longer than the soft part, the spines stiff, slender, and sharp; pectoral well developed; no ventrals; mouth very long, with numerous blunt, conical teeth in several rows in the jaws; similar teeth on the vomer and palatines; a tentacle on the snout; gill-openings wide, the gill-membranes joined, free from the isthmus; scales small, imbedded; no lateral line.

Japan; curious little fishes, brightly colored; not closely allied to any of the other blennies.

(νεός, new; Zoarces, a genus of another family.)

a. Head $4\frac{3}{5}$ in length; maxillary extending far beyond eye; head below with a distinct dark network .... *pulcher*, 25.

aa. Head $6\frac{1}{3}$ in length; maxillary extending little beyond eye; head relatively plain below .... *steindachneri*, 26.

25. NEOZOARCES PULCHER Steindachner.

Neozoarces pulcher STEINDACHNER, Ichth. Beitr., IX, 1880, p. 27, pl. VI, fig. 2; Gulf of Strielok.

Head $4\frac{3}{5}$ in length; depth $9\frac{1}{3}$; eye $6\frac{1}{3}$; snout $4\frac{1}{3}$; D. XLI+50; A. I.+75; P. 10.

Head deep and long, much larger than in *N. steindachneri;* mouth very large, the cleft and the maxillary excessively large, extending far beyond eye; teeth on jaws, vomer, and palatines; snout with a prominent, unbranched villus anterior to the interorbital space; head naked; body with minute scales, no lateral line. Dorsal and anal confluent with the small, pointed caudal.

Color, much like that of *N. steindachneri*, except that the head below eye is covered with a distinct, dusky network; the belly is similar, the lines being somewhat less distinct; a median row of small, dusky spots extends along the side, larger anteriorly, becoming smaller and disappearing as the caudal is approached.

The species has not been seen by us. It is probable that the description of Steindachner covers two distinct species, the one figured having a larger head, a much wider mouth and longer maxillary, and differing in color from the other, which is our *Neozoarces steindachneri* (*pulcher*, pretty).

26. NEOZOARCES STEINDACHNERI Jordan and Snyder, new species.

Head $6\frac{1}{3}$ in length; depth 9; eye 5 in head; snout 5; interorbital space $7\frac{1}{2}$; D., XXXVIII, 49; A. I, 72.

Head long, pointed; the jaws equal; interorbital space flat or slightly concave; maxillary extending beyond eye, equal in length to one-half the distance between tip of snout and posterior edge of opercle exclusive of flap. Teeth in narrow bands on jaws, vomer, and palatines. Pseudobranchiæ large; gillrakers on first arch 4+12, rather thick, pointed. Anterior part of interorbital space with a rather thick, erect tentacle, about equal in height to diameter of pupil; a low fleshy keel on snout anterior to the tentacle; no other tentacles on head. Nostrils with slender tubes; head naked; body covered with minute circular deeply embedded scales; no lateral line. Dorsal inserted above base of pectoral, confluent with the caudal; spines short, strong, curved, the longest not equal in height to diameter of eye; length of spinous part $2\frac{1}{10}$ in head and body; rays of dorsal higher than the spines; membrane of fin fleshy, especially anteriorly, concealing the spines and rays, not incised on the border; anal about equal in height to the spinous dorsal, the spine strong; membrane of fin fleshy, becoming more thin posteriorly, not incised between the rays; fin confluent with the caudal; caudal a little shorter than diameter of eye, pointed; confluent above and below with dorsal and anal; pectoral $1\frac{3}{4}$ in head, rounded, the edge incised between the rays.

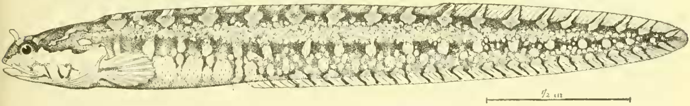

FIG. 18.—NEOZOARCES STEINDACHNERI.

Color in spirits, yellowish-white, mottled and reticulated with dusky; a series of about 17 dark, vertical bars on upper fourth of body extending to top of fin, the bars shaped somewhat like an hourglass, the lateral borders black, the upper inside parts growing lighter posteriorly, the borders appearing as black lines; middle of body with a row of quadrangular spots with narrow bands extending downward from the corners along sides of belly; posterior to anal opening the bars are replaced by a network from which blackish lines pass down over the anal; between the dark lateral spots, at regular intervals, are circular spaces of the body color; between the dorsal and the median spots is an indistinctly mottled area; snout, interorbital space, and occiput, each with a broad, transverse, dusky band; a white area with wavy borders extending from tip of snout to end of opercular flap; lower part of head with a network of lines inclosing 3 or 4 spaces; throat white; chin with 2 narrow cross-bars; pectoral with a narrow dusky bar extending outward from the base to near middle of fin. One specimen is darker than the others, the color-pattern being the same.

Five specimens, 60 mm. long, from Hakodate and one from Otaru. Found living among the algae in shallow water.

Type No. 7075, L. S. Jr. Univ. Mus.; cotype No. 50277, U. S. N. M.

The species differs from *N. pulcher* as figured and described by Steindachner in having a longer and more pointed head, a shorter mouth, and in color.

(Named for Dr. Franz Steindachner.)

16. ZOARCHIAS Jordan and Snyder.

Zoarchias Jordan and Snyder new genus, of *Blenniidæ* (*veneficus*).

This genus differs from *Neozoarces* in the much shorter spinous dorsal and the much greater number of rays in the soft dorsal. There is no tentacle on the forehead.

Northern Japan.

(Name modified from *Zoarchus*, a more correct form of *Zoarces*.)

27. ZOARCHIAS VENEFICUS Jordan and Snyder, new species.

KAZUNAGI (SWARMING EEL).

Head $6\frac{2}{3}$ in length; depth 11; eye 5 in head; snout $3\frac{1}{2}$; interorbital space $7\frac{1}{2}$; D. XXVIII, 77; A. I, 78.

Body long and slender, gradually sloping from head to the pointed tail. Head long, pointed; snout sharp; the jaws equal; eyes high up, the upper rim of orbit forming a fleshy projection above level of interorbital space. Mouth wide, the cleft on lower side of head, parallel with ventral outline, the maxillary extending beyond orbit, its length equal to one-half the head; teeth in narrow bands on jaws, vomer, and palatines; gill-membranes forming broad fold across isthmus; gill-rakers on first arch about 3+12, minute, slender, pointed; pseudobranchiæ large; head without filaments or papillæ; nostrils with tubes; head naked; body with minute, circular, deeply-embedded scales; no lateral line.

Dorsal inserted above base of pectoral, the spines strong, curved, pungent, their length somewhat less than diameter of orbit; membrane of fin thick anteriorly, becoming somewhat thinner posteriorly, concealing the spines and rays not incised between them; anal inserted below eighteenth spine of dorsal, the spine strong, equal in height to the rays, which are somewhat less than diameter of orbit; membrane of fin not incised; dorsal and anal confluent with the caudal, which is sharply rounded; pectoral rounded, $1\frac{4}{5}$ head; no ventrals.

Color in spirits, light brownish-yellow, marked with dusky; head clouded and reticulated above, almost immaculate below, the lower border of the dusky color sharply defined by a band from snout through lower part of eye to opercle; dusky color of body forming a sort of network with a row of circular openings about the size of pupil, extending along middle of side to tail; above the larger openings are many smaller ones; prolongations extend upward and downward from the network, forming pointed vertical bars on the fins, 21 on the dorsal, 18 on the anal; sides of belly with 4 or 5 pointed projections; pectoral with a small dark spot at its base.

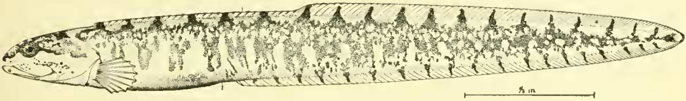

FIG. 19.—ZOARCHIAS VENEFICUS.

A great many specimens measuring about 70 mm., were collected at Hakodate. They were scooped up by the native children in large baskets from the algae growing in the shallow water near shore. Specimens were also found at Mororan and at Otaru.

Type No. 7076, L. S. Jr. Univ. Mus.; cotype No. 50278, U.S.N.M.

(*veneficus*, one who bewitches, from the bewildering coloration.)

17. DICTYOSOMA Schlegel.

Dictyosoma SCHLEGEL, Fauna Japonica, Poiss., 1846, p. 139 (*burgeri*).

Body elongate, covered with very small, smooth scales; lateral line forming an elaborate network; two series of mucous pores running longitudinally, connected by vertical cross lines. Mouth moderate, the jaws with small teeth; no teeth on vomer or palatines; dorsal fin long, of many spines and a few soft rays, the soft part partly joined to the caudal; anal with two simple spines; ventrals reduced each to a scale-like projection, which disappears in maturity.

Japan.

(*δίκτυον*, net; *σῶμα*, body.)

28. DICTYOSOMA BURGERI Van der Hoeven.

DAINANGINPO (FORMOSA SILVER-TAIL). KAMISORI UWO (RAZOR-FISH).

Dictyosoma Schlegel, Fauna Japonica, Poiss., 1846, p. 139, pl. lxxiii, fig. 3, Shimabara, near Nagasaki.

Dictyosoma burgeri Van der Hoeven, Handbuch der Dierkunde, about 1850, p. 347.—Bleeker, Ichth. Fauna Japan, 1853, p. 9; Kaminoseki.

Dictyosoma temmincki Bleeker, Verh. Bat. Gen., XXV, Japan, p. 42; Nagasaki.—Günther, Cat. Fish., III, 1861, p. 279, copied.—Ishikawa, Prel. Cat., 1897, p. 35; Boshu, Misaki, Sagami Bay, Hakodate, Kishin.

Head 6½ in length; depth 7½; eye 6½ in head; interorbital space 13; snout 4⅓; D. LII, 10; A. I, 42.

Snout short, blunt, the upper part with a fleshy ridge, which continues backward to the occiput, growing lower posterior to eyes; lower jaw somewhat longer than the upper; mouth oblique, maxillary extending slightly beyond a vertical through posterior edge of orbit; lips very large, thin; teeth in narrow bands on jaws, vomer, and palatines, the outer row on the jaws enlarged; gill-rakers on first arch 2 + 10, small, slender, rather widely spaced; pseudobranchiæ large; nostrils with small tubes; no filaments on head.

Head naked; body covered with minute, rather deeply embedded scales; lateral line forming a complicated network on body.

Dorsal inserted a little posterior to base of pectoral, spines growing longer posteriorly, the longest 3¼ in head; longest rays 2⅓; membrane of fin thick and fleshy, concealing the spines, not incised; anal spine weak, rays becoming longer posteriorly, those near middle of fin measuring 3⅓ in head; membrane of fin thickened about the rays, incised between them, leaving the tips free; dorsal and anal united with the caudal, there being a small incision at their union; pectoral rounded, 2½ in head; ventrals sometimes represented, usually in small specimens, sometimes in large ones, by a pair of minute spines.

Color, blackish or bluish olive, the head lighter, finely speckled with blackish; a broad light band passing downward and backward from eye. Some individuals have the body sparsely spotted with black.

This species is very abundant in the rocky bays of middle Japan. Our many specimens are from Aomori, Tokyo, Misaki, and Wakanoura. It reaches a length of about 15 inches, and often comes into the markets.

(Named for Mr. Bürger, who collected specimens and drawings at Nagasaki for Siebold and Schlegel.)

18. OPISTHOCENTRUS Kner.

Opisthocentrus Kner, Sitsber. Akad. Wiss. Wien, 1868, p. 49 (*quinquemaculatus*).
Blenniophidium Boulenger, Proc. Zool. Soc. Lond., 1892, p. 583 (*petropauli*).

Body moderately elongate, compressed, covered with very small cycloid scales; head with small scales; mouth small, protractile, with fleshy lips; small conical teeth on jaws and on vomer; no cirri; gill-membranes broadly connected, but free from isthmus; branchiostegals 4; dorsal fin very long, extending from the nape to the caudal, with which it is subcontinuous, a few of the posterior rays stiff spines, the rest being simple, not articulate, flexible; anal fin extending from the anus, which is a little nearer the anterior than the posterior extremity, to the caudal, with two slender spines in advance of the soft rays; no ventrals; no lateral line; no prominent anal papillæ; pyloric appendages present. A remarkable genus, allied to *Lumpenus*, or rather to *Plectobranchus*, distinguished by having only the posterior spines rigid.

North Pacific.

(ὄπισθε, behind; κέντρον, spine.)

a. Dorsal rays about 59; anal II, 36; no sharply defined cross-streaks on head; dorsal fin with about 6 black ocelli .... *ocellatus*, 29.
aa. Dorsal rays about 51; anal II, 33; head with sharply defined cross-lines like pen marks; dorsal fin with about 4 blackish spots .... *zonope*, 30.

29. OPISTHOCENTRUS OCELLATUS (Tilesius).

GAZU.

Ophidium ocellatum Tilesius, Mem. Ak. St. Petersb., II, 1811, p. 237; Kamchatka, D. 80; A. 50 (evidently an error). The rude figure shows D. 73; A. 50; the spines low; the dorsal with 5 ocelli.

Gunnellus apos Cuvier and Valenciennes, Hist. Nat. Poiss., XIV, 1839, p. 426, after Tilesius.

Centronotus apos Günther, Cat., III, 1861, p. 288.

Centronotus (*Opisthocentrus*) *quinquemaculatus* Kner, Sitzber. Akad. Wiss. Wien, 1868, p. 48, pl. vii, fig. 20; "Pinang." Described from a young example 2 inches long, No. 6353, Mus. Wien. Doubtless from Decastris Bay.

Opisthocentrus reticulatus Steindachner, Ichth. Beitr., X, 1881, p. 11, pl. v, fig. 2; Gulf of Strielok (Coll. Prof. Dybowski).

Blenniophidium petropauli Boulenger, Proc. Zool. Soc. Lond., 1892, p. 584, with plate; Petropaulski (Coll. George Baden-Powell). D. 52; A. 37; 5 ocelli.

Opisthocentrus tenuis Bean and Bean, Proc. U. S. Nat. Mus., 1897 (January 28), p. 463, pl. xxxv; Volcano Bay, Port Mororan, Japan. (Coll. Col. Nicolai A. Grebnitski. Type No. 47565, U.S.N.M.)

Opisthocentrus quinquemaculatus Steindachner, Ichth. Beitr., IX, 1880, p. 25.—Bean and Bean, Proc. U. S. Nat. Mus., 1896, pp. 381, 392; Petropaulski.

Opisthocentrus ocellatus Jordan and Gilbert, Rept. Fur Seal Invest., 1898, p. 384.—Jordan and Evermann, Fish N. and M. Amer., III, p. 2429.

Head $5\frac{2}{3}$ in length; depth 6; depth of caudal peduncle $2\frac{4}{5}$ in head; eye $4\frac{2}{3}$; interorbital space $5\frac{2}{3}$; snout 6; D. LIX; A. II, 36.

Interorbital space low, flat; snout sharp; jaws equal; mouth oblique, maxillary as long as snout, not reaching anterior edge of orbit, teeth in narrow bands on jaws; about 4 small teeth on the vomer, none on the palatineso, gillrakers on first arch 3+12, the upper 3 very small, the lower series rather long and slender, except the lowermost 2 or 3, which are short; pseudobranchiæ large, nostrils with small tubes; no tentacles on head. Membrane of dorsal somewhat thickened, not incised between the spines; anterior rays rather soft, the posterior ones strong, curved, pungent; height of middle rays 3½ in head; membrane thickened, especially anteriorly incised between the rays. Caudal rounded, 1⅓ in head; pectoral similar in shape, 1⅔ in head.

Head with scales, except on snout and ventral parts; body covered with minute scales; membrane of dorsal with scales between the rays, especially on posterior part; no lateral line.

Body olivaceous, vaguely mottled or reticulated with dusky; upper part of head dark; a dark line extending downward from eye; dorsal fin with 6 prominent ocelli, which grow longer and less sharply defined with age, the young often bright green, taking the color of the eel grass in which they live. The species is subject to much variation.

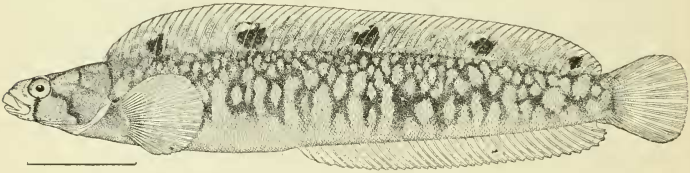

FIG. 20.—OPISTHOCENTRUS OCELLATUS.

The head measures from 4½ to 6 in the length according to age. The spots in our specimens vary from 5 to 7. The dusky mottling may be absent from the body, or it may be very conspicuous, there being all gradations of color from one locality. Jordan and Evermann note the following variations: Ocelli 5 to 9, usually 6; dorsal 55 to 61, usually 58 or 59; anal 36 to 39 (including the spines which are counted as rays).

Some specimens from Petropaulski Harbor (representing *O. reticulatus* Steindachner) have markings on the head and neck much like our *O. zonope*. They have, however, vomerine teeth and a larger number of dorsal ocelli and also more dorsal spines, agreeing in those respects with *O. ocellatus*.

Our very many specimens are from Hakodate, Aomori, Mororan, and Otaru. We have examined others from Petropaulski. The species is excessively common in the Bay of Mororan, the young swarming in the eel-grass, *Zostera*.

(*ocellatus*, with eye-like spots.)

30. OPISTHOCENTRUS ZONOPE Jordan and Snyder, new species.

Head 5½ in length; depth 5¼; depth of caudal peduncle 2⅔ in head; eye 4½; snout 3½; interorbital space 4¾; D. LI; A. II, 33.

Body a little deeper than in *O. ocellatus;* interorbital space broad and flat; jaws equal; maxillary short, scarcely reaching anterior edge of pupil; teeth small, blunt, widely spaced, in narrow bands on jaws, none on vomer or palatines; gill-rakers on first arch 13, small, slender, pointed; pseudobranchiæ large; nostrils with tubes; no filaments on head; large mucous tubes on head; a row on lower jaw, on posterior and anterior borders of eye, and another extending from eye to upper edge of gill-opening; a large pore between eyes and also on nape. Head with scales on cheeks and occiput; body with small, smooth scales; membrane of dorsal fin with a few minute scales extending upward on its base, more evident on posterior part; no lateral line.

Dorsal inserted above base of pectoral, joined to the caudal posteriorly, a notch separating them; membrane of fin thickened anteriorly, not incised along its edge; spines slender except the last 12 or 15, which are strong, stiff, and curved, those near middle of fin contained two times in head; anal inserted below nineteenth spine of dorsal, the spines slender, weak, and not pungent, the rays near the middle contained about 2⅖ in head; the fin not connected with the caudal; the membrane rather thin, incised between the rays; caudal rounded, 1¼ in head; pectoral broad, rounded, 1¼ in head, no ventrals.

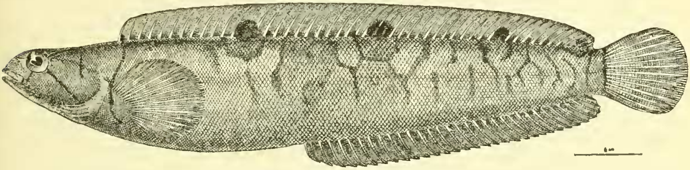

FIG. 21.—OPISTHOCENTRUS ZONOPE.

Color, light olive-green, the sides with indistinct, irregularly shaped, vertical lines or bars, in some specimens connected in a network; head with a number of sharply defined, narrow, dark bands, one passing across interorbital space through eye, downward on chin, another extending from eye backward and downward to subopercle, a curved band passing over occiput and connecting eyes, another passing over the nape and downward on opercle; a narrow band extending from base of pectoral upward to beginning of dorsal (these lines present and sharply defined on a series of 25 specimens); base of caudal with a narrow, vertical, dark band; dorsal with 4 large, round, black spots with faint, light margins, the first spot on the twelfth and thirteenth spines, the second on the twenty-fifth and twenty-sixth, the fourth near end of fin; the second spot as large as eye; the number and location of the spots are constant in our specimens; the dorsal fin is also lightly clouded with dusky.

Described from a specimen about 125 mm. long. Type 7077, L. S. Jr. Univ. Mus.; co-type No. 50292, U.S.N.M. The species may be recognized at a glance by the bands on the head and the 4 large spots on the dorsal. It is represented by many specimens from Mororan, and one from Otaru. It occurs in shallow water in the eel-grass.

Dorsal spines.	Anal rays.
52	II, 30
51	II, 31
52	II, 33
50	II, 29
51	II, 33
52	II, 31
51	II, 33

(*ζώνη*, zone; *ὠπή*, look.)

19. ABRYOIS Jordan and Snyder, new genus.

Abryois Jordan and Snyder, new genus of *Blenniidæ* (*azumæ*).

This genus differs from *Opisthocentrus* in having a naked head without tentacles; teeth in narrow bands on jaws and vomer, none on palatines; gill membranes forming a broad fold across the isthmus; body with minute, partly embedded scales; membranes of dorsal and anal with scales; dorsal spines flexible anteriorly, becoming strong near the middle, the posterior ones rather heavy; anal with 2 slender spines.

(*ἀ*, neg. prefix; *βρυόεις*, mossy, there being no tentacles on the head.)

31. ABRYOIS AZUMÆ Jordan and Snyder, new species.

Head $6\frac{2}{3}$ in length; depth 6; depth of caudal peduncle $1\frac{7}{8}$ in head; eye $6\frac{1}{2}$; interorbital space $4\frac{3}{4}$; snout $3\frac{1}{5}$; D. LII; A. II, 40.

Interorbital space broad, convex; snout rather blunt; jaws equal; mouth oblique, maxillary extending to a vertical through anterior edge of pupil; teeth stout, sharp, in narrow bands on jaws and vomer, none on palatines. Anterior edge of shoulder girdle with an elevated sharp ridge. Gill-rakers on first arch 4+14, close set, the middle ones long, slender. Nostrils with tubes; no tentacles on head. Numerous large mucous pores on head. Head naked; body covered with small, close set, partly embedded, cycloid scales; membranes of dorsal and anal with scales between the spines and rays; basal fourth of caudal with scales; no lateral line.

Dorsal inserted above base of pectoral, the spines gradually growing higher to a point above middle of anal, where they measure 3 in the head; anterior spines slender, soft, growing stiff and pungent near middle of fins; posterior spines strong, curved, the basal half compressed; membrane of fin fleshy, not incised between the spines. Spines of anal small, the tips pungent, rays highest near anterior end of fin, $2\frac{3}{5}$ in head; membrane thick, slightly incised between the rays. Caudal rounded, $1\frac{1}{2}$ in head. Pectoral rounded, $1\frac{1}{2}$ in head.

Color in spirits brownish, with a dark round spot on dorsal above middle or a little posterior to middle of pectoral. In life the color of the body is olive brown, the spot bright greenish blue.

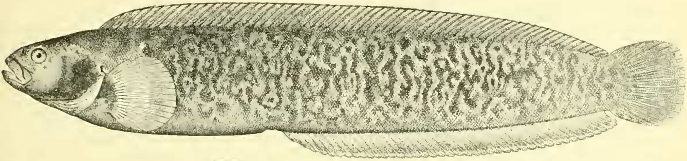

FIG. 22.—ABRYOIS AZUMÆ.

Described from a specimen about 400 millimeters long from Mororan. Smaller specimens from the same locality are lighter in color, the spots being inky black; they have a narrow dark band extending downward and forward from eye, another downward and backward disappearing on cheek, a crescentic band on occiput connecting the eyes.

Type No. 7078, Leland Stanford Junior University. Cotype No. 50294, U.S.N.M.

Dorsal.	Anal.
LXI	II, 38
LXII	II, 40
LXIII	II, 37
LXI	II, 39
LXIII	II, 41
LXIII	II, 39

We have many specimens from Mororan and Otaru, where it occurs in the eel grass.

(*Azuma*, the poetical name for eastern Japan.)

20. PHOLIDAPUS Bean and Bean.

Pholidapus BEAN and BEAN, Proc. U. S. Nat. Mus., 1896, p. 389 (*grebnitskii*).

Body moderately elongate, compressed, covered with very small, smooth scales. Mouth small, horizontal; bands of small teeth on jaws and vomer, none on palatines. Head naked; gill membranes broadly connected, free from the isthmus; dorsal very long, composed entirely of flexible spines; anal of soft rays; caudal short, rounded, separate; no ventral fins; no lateral line; pyloric cæca present. This genus is close to *Opisthocentrus*, but has no pungent spines, and the head is naked. Okhotsk Sea.

(*φολίς*, *Pholis;* *ἄπους*, without feet, i. e., ventral fins.)

a. Dorsal spines, 62 to 64; dorsal fin with 1 to 3 dark ocelli .... *dybowskii*, 32.
aa. Dorsal spines, 57; dorsal fin without ocelli .... *grebnitzkii*, 33.

32. PHOLIDAPUS DYBOWSKII (Steindachner).

Centronotus dybowskii Steindachner, Ichth. Beiträge, IX, 1880, p. 22; Gulf of Strielok, near Vladivostock.—Jordan and Evermann, Fish N. and M. Amer., III, p. 2430; Iturup Island.

Head 5½ to 6⅔; depth 6 to 6½; D. LXII or LXIII; A. II, 39. Eye 3⅗ to 4⅔ in head; snout a little longer than eye; lower jaw scarcely included; 1 or 2 strong, conical teeth on each side behind the narrow premaxillary band of teeth; teeth on vomer, none on palatines; no cirri; large pores about eye and on opercles; longest dorsal spines 2½ to 3 in depth of body, last spines shorter and stiffer than the others; dorsal and anal slightly joined to caudal; pectoral as long as caudal; about 1¼ in head. Head naked.

Brown or grayish, with faint spots or marblings; 1 or 2, rarely 3, dark ocelli on the dorsal; 3 or 4 dark streaks radiating from eye, the uppermost joining its fellow. Length 10 to 15 inches.

Sea of Okhotsk, north to the Kuril Islands. Our specimens, 5 in number, the longest 25 cm. long, from Shana Bay, Iturup Island. The scales are entire, strongly marked with concentric striæ. The dorsal spines number 62, 63, 63, 64, 64. Dorsal ocelli are present on all our specimens, 2 of them being faintly visible, even in the youngest, 55 mm. long. (Named for Professor Dybowskii, its first collector.)

33. PHOLIDAPUS GREBNITZKII Bean and Bean.

Pholidapus grebnitzkii Bean and Bean, Proc. U. S. Nat. Mus., 1896, p. 390, pl. xxxiv; Volcano Bay, Japan. (Coll. Col. Nicolas A. Grebnitzki.)

This species from Volcano Bay, near Mororan, may differ in the smaller number of dorsal spines and in the absence of dorsal ocelli. Not having examined the types, we are not sure of its distinction from *Ph. dybowskii*.

The specimens are 141 mm. long, including caudal; 126 mm. to base of caudal. The head (22 mm.) is equal to the greatest depth of body. The eye is slightly longer than the snout and one-fourth as long as the head. The interorbital space is narrow, two-thirds of the length of the eye. The naked head resembles that of *Pholis;* its length is contained about 5½ times in total length without the caudal. The mouth is small and very oblique; the mandible is slightly included and has a well-developed lip. The maxilla is partly concealed under the preorbital bone; it does not quite reach to below the anterior margin of the pupil. The anterior nostril is midway between the eye and the tip of the intermaxilla. Seven mucous pores around the orbit; 3 on the preorbital bone. The pore in the origin of the semicircular dark band around the nape is continued backward by a series of 6 similar ones, ending near the upper angle of the gill opening. A series of 10 or 11 pores, beginning near the front of the chin on each side, extending backward, and curving upward to the upper anterior edge of the operculum. The gill membranes are broadly united, but they are not joined to the isthmus. The dorsal origin is over the end of the head; the fin is low and consists of spines, the longest and strongest in the posterior third being slightly longer than the eye. The distance of the vent from the tip of the snout contains the head length $2\frac{2}{3}$ times. The anal is slightly lower than the dorsal, the rays longest posteriorly. The caudal is rounded, and is barely separated from the dorsal and anal. The pectoral base is broad, and the fin is two-thirds as long as the head. The intestine is slender and is more than twice as long as the head. Stomach short, pear shaped, with 6 slender, pyloric cæca of unequal length, the longest about twice as long as the eye. The body is completely scaled; the scales very small, cycloid, closely imbricated, with numerous concentric striæ, and they extend halfway up the membrane, connecting the dorsal spines.

The general body color is brown; the sides sparcely and vaguely mottled. The pectorals are pale. A narrow dark band extends from the middle of the eye downward and forward, a similar band running backward from the eye on the preopercle; an interrupted semicircular band from eye to eye across the nape. D. LVII; A. II, 39 or 40. (Bean and Bean.)

(Named for Col. Nicolas Grebnitski, late governor of Komandorski, to whose industry and zeal the Museum is indebted for many valuable collections.)

21. ERNOGRAMMUS Jordan and Evermann.

Ernogrammus JORDAN and EVERMANN, Fish. N. and M. Amer., III, 1898, p. 2441 (*enneagrammus*).

This genus has the general characters of *Stichæus*, but there are 3 distinct lateral lines, each of which has numerous short, oblique branches, ending in a large pore, these not extending across to join the other lateral lines; dorsal high; pectorals and ventrals well developed; body not greatly elongate.

(*ἔρνος*, branch; *γραμμή*, line.)

a. Dorsal spines about 41; pectoral banded; head with three oblique bands.
  b. Anal rays 28; depth 5 in length .... *hexagrammus*, 34
  bb. Anal rays 34; depth $6\frac{2}{3}$ in length .... *enneagrammus*, 35
aa. Dorsal spines 49; anal rays 32; pectoral banded; head nearly plain... *epallax*, 36

34. ERNOGRAMMUS HEXAGRAMMUS (Schlegel).

Stichæus hexagrammus SCHLEGEL, Fauna Japonica, Poiss., 1846, p. 136, pl. LXXIII, fig. 1; Bay of Shimabara, near Nagasaki.—GÜNTHER, Cat. Fish., III, 1861, p. 284.

Head $4\frac{1}{3}$ in length; depth 5; depth of caudal peduncle $3\frac{1}{2}$ in head; eye $5\frac{1}{2}$; interorbital space $10\frac{1}{2}$; snout 4. D. XLI; A. I, 28.

Body subcylindrical, head low, somewhat flattened above; interorbital space flat; snout pointed; jaws equal, maxillary extending almost to a point below posterior border of eye. Teeth in narrow bands on the jaws, vomer, and palatines. Gill membranes extending forward at their union, forming a V-shaped fold across the isthmus. Pseudobranchiæ large; gill rakers on first arch, 8 or 10, very short and blunt. Nostrils with tubes; no tentacles on head.

Head naked; body closely covered with minute smooth scales. Lateral lines 3, with very short branches above and below, each ending in a large pore; the upper line extending from above gill opening to caudal; the median one passing from upper edge of base of pectoral to middle of caudal; the lower one originating in front of ventrals, dividing two branches just behind base of pectoral, passing backward along belly, the branches uniting at origin of anal and extending along base of that fin.

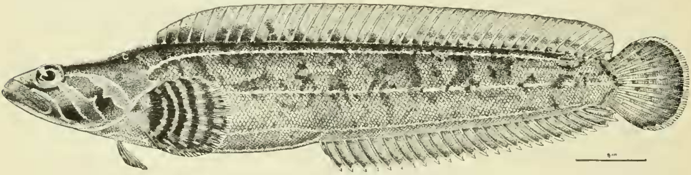

FIG. 23.—ERNOGRAMMUS HEXAGRAMMUS.

Dorsal spines not very rigid, highest behind middle of fin, 3 in head, membrane of fin rather thin, not incised between the spines, united to base of caudal; anal spine slender, small; highest rays $3\frac{1}{4}$ in head; pectoral rays much broadened toward their tips, the membrane incised between them; the fins rounded, $1\frac{1}{2}$ in head; ventrals equal in length to 2 times the diameter of eye.

Body with indefinite, dark, vertical bands, most evident on the younger specimens; side of head with 3 oblique, dark bands with white edges; dorsal dark, the posterior spine with whitish tips; anal narrowly edged with white; pectoral with 5 or 6 narrow, white bars; caudal edged with white, sometimes having a broad, whitish blotch on base.

Described from many specimens about 120 millimeters long from Hakodate. We have representatives from Hakodate and Otaru.

Although described from near Nagasaki, we obtained no specimens from southern Japan.

(ἕξ, six; γραμμή, line.)

35. ERNOGRAMMUS ENNEAGRAMMUS Kner.

Stichæus enneagrammus KNER, Sitzber. Akad. Wiss. Wien, 1868, p. 16, pl. VI, fig. 19; Decastris Bay. (No. 1401c Mus. Wien.)

Ernogrammus enneagrammus JORDAN and EVERMANN, Fish. N. and M. Amer, III. 1898, p. 2441, copied.

Head $3\frac{3}{4}$; depth $6\frac{2}{3}$. D. XLI; A. 33 or 34; P. 14 or 15. Eye 4 in head; as long as snout; mouth large, nearly horizontal, the maxillary reaching middle of eye; lower jaw projecting; profile of snout nearly horizontal; fine pointed teeth in bands on jaws and across the vomer; head naked; dorsal of high, slender spines; caudal separate, rounded; anal high; pectoral long, $1\frac{1}{2}$ in head; ventrals one-half as long as pectorals; scales very small, smooth; lateral lines each with short, oblique branches, each ending in a wide pore; 1 lateral line along base of caudal from head to caudal, 1 along middle of side, 1 along base of anal to caudal, this forking at the vent and sending 2 parallel branches forward to the breast.

Brownish; 2 rows of small, dark spots along middle lateral line; dorsal and anal with dark spots and a broad, dark margin; pectorals with 3 black cross bands; a dark bar at base of caudal; 3 black bars from eye.

Okhotsk Sea. Known from a specimen $1\frac{3}{4}$ inches long, from Decastris Bay (Kner). Not seen by us. The species is very close to *Ernogrammus hexagrammus* and may prove to be the same. The anal rays a little more numerous.

(ἐννέα, nine; γραμμή, line.)

36. ERNOGRAMMUS EPALLAX Jordan and Snyder, new species.

Head 5 in length; depth $7\frac{1}{3}$; depth of caudal peduncle $3\frac{3}{5}$ in head; eye $4\frac{1}{3}$; snout $4\frac{1}{2}$; interorbital space $13\frac{1}{2}$; D. XLIX; A. I, 32.

Body slender; the head long and pointed; the snout sharp; interorbital space narrow, convex; lower jaw projecting slightly beyond the upper; maxillary extending to a vertical, through pupil. Teeth villiform, in broad bands on jaws, vomer, and palatines. Gill opening extending forward below, forming a V-shaped fold across the isthmus. Pseudobranchiæ large; gill-rakers on first arch short. Nostrils with slender tubes, equal to two-thirds the length of the snout; no filaments. Numerous large mucous pores on various parts of the head.

Body covered with minute, cycloid, elongate scales; posterior part of dorsal membrane and basal part of caudal and pectoral with scales; head naked. Lateral lines 3; the first extending from a point just above gill opening, along upper part of body to near the caudal, with long branches at short intervals extending toward the dorsal fin; the second line branches downward from the first above base of pectoral, and extends along median part of body to base of caudal, without long branches; the third line unites with the one on the opposite side of the body just behind the isthmus, extends backward, branching behind base of pectoral; the upper branch passes backward to near base of caudal fin, sending down several small lines toward the anal fin; the lower branch, which is connected with the upper one anteriorly by 3 or 4 cross lines, extends along belly to base of anal fin; each line has numerous, very short branches, which end in large pores.

Dorsal fin inserted a little behind base of pectoral, united posteriorly with the caudal; spines slender, slightly stronger posteriorly, the middle ones $2\frac{5}{6}$ in head; membrane of fin thin, not incised. Anal inserted below seventeenth spine of dorsal, not connected with the caudal, middle rays $3\frac{1}{5}$ in head; membrane thin, incised between the rays. Caudal rounded, $1\frac{1}{2}$ in head. Pectoral rather acutely rounded, $1\frac{1}{3}$ in head. Ventrals a little longer than diameter of eye.

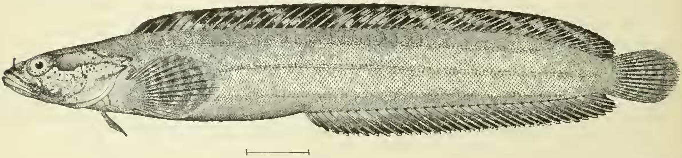

FIG. 21.—ERNOGRAMMUS EPALLAX.

Color in spirits brown; no lines or spots on head or body; fins all darker than the body, the dorsal with indistinct dark clouds, the anal narrowly edged with white posteriorly, the pectoral with 4 or 5 indistinct light vertical bands.

Described from a specimen 275 mm. long, from Otaru, loaned to us by Professor Nozawa, of the Fisheries Bureau at Sapporo.

(ἐπαλλάξ, crosswise.)

22. OZORTHE Jordan and Evermann.

Ozorthe JORDAN and EVERMANN, Fish. N. and M. Amer., III, 1898, p. 2441 (*hexagrammus=dictyogrammus* Kner, not of Schlegel).

This genus has the general character of *Ernogrammus*, but besides the 3 chief lateral lines on each side there are two or more incomplete ones, and the lines are connected by numerous branches extending at right angles to them.

Ochotsk Sea.

(ὄζος, branch; ὀρθή, right angle.)

37. OZORTHE DICTYOGRAMMUS (Herzenstein).

Stichæus dictyogrammus HERZENSTEIN, Mélanges Biol., 1890, p. 121; Hakodate.
Stichaeus hexagrammus KNER, Sitzber, Akad. Wiss. Wien, 1868, p. 45; Decastris Bay, not of Schlegel.

Head $4\frac{3}{4}$ in length; depth 5; depth of caudal peduncle $2\frac{3}{4}$ in head; eye 6; snout 4; interorbital space $10\frac{1}{2}$. D. XLV.; A. I, 25.

Body rather deep and compressed; head pointed; interorbital space convex; jaws equal, maxillary extending to middle of eye. Teeth minute, in narrow bands on jaws, vomer, and palatines; gill-membranes continued forward below, forming a V-shaped fold across the isthmus. Gill-rakers on first arch 10, short, pointed. Pseudobranchiæ large. Nostrils with low tubes; no filaments on head.

Head naked; body covered with minute, closely apposed, cycloid scales. Lateral line system forming a complicated network; a complete lateral line passing from upper edge of base of pectoral to middle of caudal peduncle; one above this not quite complete posteriorly, the two connected by branches which are close together and regular in position near the pectoral, farther apart and irregular posteriorly; a third line extending along base of dorsal, connected with the second by cross lines; a fourth very irregular one extending on body above base of anal; a fifth passing along close to base of anal, connected with the one above it and this in turn connected with the first described line; the fourth line may in some specimens be traced forward to base of pectoral, while in others it is so short and broken as to scarcely appear as a line; a median line along belly connecting with branches on each side with the lateral lines.

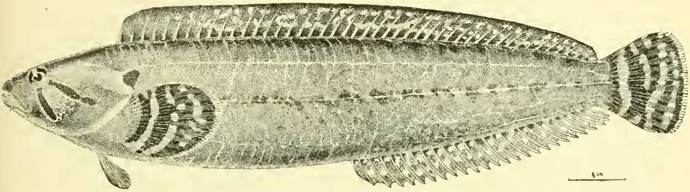

FIG. 25.—OZORTHE DICTYOGRAMMUS.

Dorsal inserted a little anterior to base of pectoral, with stiff, pungent spines throughout, the middle ones highest, $2\frac{5}{6}$ in head; membrane of fin not greatly thickened, not incised between the spines, not connected with the caudal rays. Anal inserted below twenty-first dorsal spine, the spine short and slender, the rays highest on anterior third of fin, $2\frac{3}{4}$ in head; membrane incised between tips of rays, not connected with the caudal rays. Caudal rounded, $1\frac{1}{2}$ in head. Pectoral rounded, $1\frac{1}{4}$ in head, the edge incised, its length $1\frac{1}{4}$ in head; ventrals $2\frac{3}{4}$ in head.

Color in spirits dark brownish or blackish; a round black spot above upper edge of gill opening; eye with 3 dark bands radiating from it, the 2 on cheek most prominent, the other extending backward from eye, not evident on all examples; dorsal fin indistinctly spotted with blackish; pectoral and caudal with light vertical bands of irregular shape; anal with elongate light spots, the edge narrowly tipped with white; caudal tipped with white.

In life the spot on shoulder is steel blue and very conspicuous; the body is covered with bands and clouds of dull orange; a bright band on bases of caudal and pectoral.

Described from a specimen about 100 mm. long from Hakodate.

Dorsal.	Anal.
44	I, 23
44	I, 24
44	I, 23
43	I, 23
44	I, 23

We have many specimens from Hakodate, Nemuro, and Same.

(*δίκτυον*, net; *γραμμή*, line.)

The following is the substance of Herzenstein's description of *Ozorthe dictyogramma:*

Head 4; depth $4\frac{2}{3}$ in length of body (without caudal?); D. 44; A. 24 or 25; P. 14; V. 4. Eye $5\frac{5}{8}$ in head, nearly half greater than interorbital space.

Maxillary reaching to opposite front of middle of eye; mouth oblique; head with numerous pores; nostrils with short tubes midway between eye and tip of snout; teeth in broad bands on jaws, vomer, and palatines; head naked; a naked area between nape . . . dorsal and anal; body thickly scaled, lateral line somewhat variable, the upper runs from gill-opening above concurrent with the back, uniting itself near end of body with the middle line, which begins over the pectoral and ends at middle of caudal. From the upper line numerous cross branches run to the base of dorsal, where they form a network by means of a faint uppermost horizontal line; numerous vertical cross branches between upper and middle lateral line. From middle lateral line vertical branches run downward, which unite to form a line between ventrals and anal, more or less interrupted. Similar branches above the anal, where they unite partly in a line along base of anal. Branches of lateral line spreading over region before ventrals and pectoral.

Dorsal beginning over gill-opening and joined to base of caudal; longest spine 3 in head, the last and the first a little shorter; last anal rays reaching caudal; pectoral as long as from tip of snout to preopercle; ventrals nearly half as long as pectorals; caudal $7\frac{1}{2}$ to 8 in length of body.

Color apparently uniform; two or three dark stripes backward and downward from eye; dark spots on dorsal and anal and irregular dark cross streaks on pectoral and caudal.

Known from two specimens from Hakodate, collected by Maximowicz in 1863. (Herzenstein.)

23. STICHÆOPSIS Kner and Steindachner.

Stichæopsis Kner and Steindachner, Sitzber. Akad. Wiss. Wien, 1870, p. 21 (*nana*).

Body moderately elongate, strongly compressed, scaleless. Head short, pointed. Jaws equal, with a band of fine-pointed teeth; no teeth on vomer and palatines. Dorsal rays all spinous, only the anterior ones flexible at tip, the others stiff. Dorsal, anal, and caudal united. Ventrals regularly formed, close together, each I, 4; jugular in position. Pectoral long, pointed; caudal short. Lateral lines, three, obscure, all incomplete.

Okhotsk Sea.

(*stichæus*, ὄψις, appearance.)

38. STICHÆOPSIS NANA Kner and Steindachner.

Stichæopsis nana Kner and Steindachner, Sitzber. Akad. Wiss. Wien, 1870, p. 21; Decastris Bay.

Head 4 in total length 3½ in body; depth 5; eye 4 in head; snout 4; D. XLVI; A. 20–21; C. 15; V. 5–5; P. 14.

Mouth oblique, maxillary extending to a point a little anterior to middle of eye. The upper of the strongly developed lateral lines begins at upper edge of gill-opening and extends to a point below base of tenth or twelfth dorsal spine. The second or middle one begins not far from the tip of depressed pectoral and ends above the middle of the body; the third extends above base of anal.

Body light brown, with irregular reddish-brown spots, which also occasionally occur on the dorsal. Anal with a dark border on the under side of the rays. Three dark bands radiate below and behind the eye. A dark-brown spot behind base of pectoral; a second at beginning of upper lateral line. Many brown specks on head, body, and fins.

A small specimen, somewhat over an inch long, from Decastris Bay. (Steindachner and Kner.)

Not seen by us.

(*nanus*, dwarf.)

24. STICHÆUS Reinhardt.

Stichæus Reinhardt, Dansk. Vidensk. Natur. og Math. Afhandl., 1837, p. 109 (*punctatus*).

Notogrammus Bean, Proc. U. S. Nat. Mus., IV, 1881, p. 147 (*rothrocki*); young.

Body moderately elongate, covered with small scales; teeth on jaws, vomer and palatines. Lateral line present, single, running alongside of back; pectorals and ventrals well developed. Dorsal moderately high, of spines only; gill-openings continued forward below, the membranes scarcely united to the isthmus; pyloric cæca present.

Arctic seas.

(στιχάω, to set in rows.)

39. STICHÆUS NOZAWÆ Jordan and Snyder, new species.

Head 5 in length; depth 6⅔; depth of caudal peduncle 3⅔ in head; snout 5½; eye 5½; interorbital space 10; D. LI, A. I, 37.

Body compressed, head rather small and pointed. Eyes large, directed obliquely upward, interorbital space convex, suborbital area narrow. Lower jaw projecting beyond the upper, lips thin, maxillary extending to posterior border of eye. Teeth in narrow bands in the jaws, the outer ones somewhat enlarged; tips of jaws each with 2 canines, those of the lower jaw the larger; vomer and palatines with narrow bands of villiform teeth. Gill-openings forming a V-shaped fold across the isthmus. Pseudobranchiæ large; gill-rakers about 3 + 9 short, flat. Nostrils with small tubes. No filaments on head.

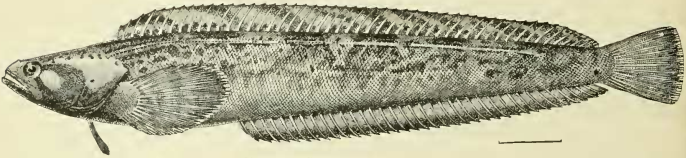

FIG. 26.—STICHÆUS NOZAWÆ.

Body covered with small smooth scales; membrane of dorsal and base of caudal with minute scales; head naked. Lateral line simple, extending from upper edge of gill-opening, along upper part of body to near the base of caudal, the pores in 2 rows.

Dorsal inserted above gill-opening, not united with caudal; the spines stiff, pungent, the middle ones contained about 4 times in head; membrane of fin not thickened, not incised between the rays. Anal inserted below fourteenth dorsal spine, the membrane thin, incised between the rays; middle rays 3¼ in head. Caudal slightly convex, 1½ in head. Pectoral rounded, the lower rays shorter than the upper; length of fin contained about 1⅙ times in head. Ventrals pointed, 3 in head.

Color in spirits light brown, indistinctly clouded with darker; small, blackish blotches along the lateral line; a brownish band extending downward from eye. A broad band, similar in color extending downwards and backward across cheek. Dorsal with 6 large blackish spots, the anterior one distinct, the others growing less definite posteriorly; scaled areas between the spines dark. Anal dark toward the edge, the rays tipped with white. Caudal, pectorals, and ventrals dusky.

Described from a single specimen 255 mm. long from Otaru, Hokkaido. The specimen was kindly loaned to us by Mr. S. Nozawa, director of the fisheries bureau at Sapporo, for whom we take pleasure in naming the species.

25. DINOGUNELLUS Herzenstein.

Dinogunellus HERZENSTEIN, Mélanges Biologiques, 1890, p. 121 (*grigorjewi*)).

General characters of *Stichæus*, the body more robust, the head strongly depressed, the eyes small, directed upward, the mouth very wide. Lateral line single, of vertical pairs of pores, ceasing near base of caudal. The validity of this genus may be questioned.

(δεινός, terrible; *Gunellus*).

40. DINOGUNELLUS GRIGORJEWI (Herzenstein).

NAGAZUKA.

Stichæus grigorjewi HERZENSTEIN, Mélanges Biologiques, 1890, p. 119, "Mori on Volcano Bay" (probably Mororan).

Head 5⅙ in length; depth 8½; depth of caudal peduncle 5 in head; eye 13½; interorbital space 10; snout 6½; D. LVI, A. I, 43.

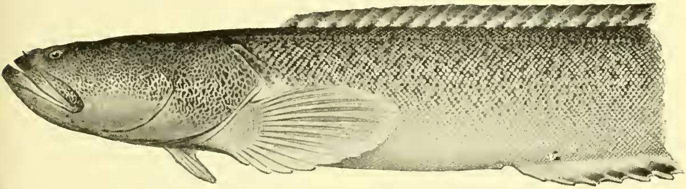

FIG. 27.—DINOGUNELLUS GRIGORJEWI.

Head large, greatly depressed, long and pointed. Eyes small, far forward, high in head, directed obliquely upward. Interorbital space concave. Mouth large, oblique, lower jaw projecting beyond the upper, maxillary extending far beyond eye, its length 2½ in head. Lips large, the lower one thickened anteriorly. Teeth in bands on jaws, those in upper jaw minute, in narrow bands, those below larger, 2 narrow toothed areas extending forward at symphysis; teeth on vomer small, blunt; those on palatines enlarged, unequal in size, the largest about as long as diameter of pupil. Gill-membranes united extending forward below, forming a V-shaped fold across the isthmus. Pseudobranchiæ large; gill-rakers very short, flat, covered with stiff cetæ. Nostrils with short tubes. No filaments on head.

Body with minute, elongate, smooth scales; membrane of posterior part of dorsal and of basal part of caudal with scales; head naked. Lateral line with 2 rows of pores, extending along upper part of body, ending before reaching caudal fin.

Spines of dorsal stiff and sharp, those near middle of fin equal in length to snout; membrane of fin thin, not connected with caudal, not incised between the rays. Rays of anal near middle of fin, $4\frac{1}{2}$ in head; membrane thick, incised, free tips of rays fleshy. Caudal truncate, 2 in head. Pectoral rather pointed, the upper rays longest, $1\frac{1}{2}$ in head. Ventrals pointed, $4\frac{1}{2}$ in head.

Color in alcohol, whitish below, darker above; upper parts speckled with brownish black; anal edged with white, lower part of pectorals white, ventrals white.

Here described from a specimen 500 mm. long from Hakodate. An example almost as large from Mito, north of Tokyo, presented by the Imperial University, does not differ from the one described.

(Named for its discoverer, Grigorjew.)

26. LEPTOCLINUS Gill.

Ctenodon Nilsson, Skandinav. Faun., IV, 1853, p. 190 (*maculatus*) (name three times preoccupied).[1]

Leptoclinus Gill, Proc. Ac. Nat. Sci. Phila., 1864, p. 209 (*aculeatus*).

Body much elongated; lateral line obsolete; teeth on jaws, vomer, and palatines; pectoral fins with the upper rays shortened; caudal fin subtruncate. Arctic seas. This genus is close to *Lumpenus*, differing mainly in the form of the pectoral.

(λεπτός, slender; *Clinus*.)

41. LEPTOCLINUS MACULATUS (Fries).

Clinus maculatus Fries, Kgl. Vet. Ak. Handl., 1837, p. 49; Bohüslän, Sweden.

Lumpenus aculeatus Reinhardt, Kong. Dansk. Vid. Selsk., VI, 1837, p. 190; no description.

Clinus aculeatus Reinhardt, Dansk. Vidensk. Selsk., Natur. Afh., VII, 1838, pp. 114, 122, 194; Spitzbergen.

Ctenodon maculatus Nilsson, Skand. Fauna, IV, 1853, p. 190.

Stichæus maculatus Günther, Cat., III, 1861, p. 281.

Lumpenus aculeatus Kröyer, Naturhist. Tidsskr., I, 1862, p. 377.

Stichæus aculeatus Günther, Cat., III, 1861, p. 282.—Collett, Norske Nord-Havs Exp., 1880, p. 67.

Lumpenus maculatus Jordan and Gilbert, Synopsis, 1883, p. 777.—Lilljeborg, Sveriges Och Norges Fish., 1891, p. 500.

Leptoclinus maculatus Gilbert, Rept. U. S. Fish Comm., 1893, p. 450.—Jordan and Evermann, Fishes N. and M. Amer., III, p. 2433; Robben Island, Kadiak, Unimak Pass, Bristol Bay.

Head 5; depth 8; D. LX (LVIII–LX); A. 36 (35–38).

Eye large, $3\frac{1}{2}$ in head; snout short and blunt, $4\frac{3}{4}$ in head, maxillary reaching past middle of eye, $2\frac{1}{3}$ in head. Teeth in jaws, vomer, and palatines, jaws each having two strong canines in front. Scale small, cycloid. First 3 or 4 dorsal spines short and free; longest dorsal spines as long as eye, caudal fin free from dorsal and anal; ventrals 3 in head; pectorals rather large, 1½ in head.

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[1] *Ctenodon* Wagler, 1830, a lizard; Ehrenberg, 1838, a rotifer; and Swainson, 1839, a fish.

Color yellowish, irregularly marked with dark spots, a series of about 6 of these spots extending along sides close to base of dorsal fin; a series of smaller spots extending along center of sides from upper base of pectoral to caudal; dorsal irregularly covered with dark spots; caudal with 4 dark cross bands; anal, ventral, and pectorals plain yellowish.

Bering Sea to Spitzbergen, south to the Aleutian Islands, the Kurile Islands, and the coasts of Sweden and Norway. This description is taken from a specimen 5¼ inches long, from Alaska, near Unimak Pass (U. S. Fish Commission steamer *Albatross* Station 3309). A few young individuals of this species, formerly known only from the North Atlantic, were taken in Unimak Pass and Bristol Bay, in 29½ to 70 fathoms. Three small specimens were also taken off Robben Island, near the coast of Saghalen, which is near the Japanese Kuriles, in 28 fathoms, and one off Karluk, Kadiak Island. The Pacific species should be compared with specimens from northern Europe. (*maculatus*, spotted.)

27. LUMPENUS Reinhardt.

Lumpenus REINHARDT, Dansk. Vidensk. Selsk. Natur., VI, 1837, p. 110 (*lumpenus=fabricii*).

Leptogunellus AYRES, Proc. Cal. Ac. Nat. Sci., I, 1854, p. 26 (*gracilis*).

Centroblennius GILL, Proc. Ac. Nat. Sci. Phila., 1864, p. 209 (*nubilus*).

Leptoblennius GILL, Proc. Ac. Nat. Sci. Phila., 1864, p. 209 (*serpentinus*).

Anisarchus GILL, Proc. Ac. Nat. Sci. Phila., 1864, p. 209 (*medius*).

Body greatly elongate, moderately compressed, covered with small scales; lateral line indistinct or obsolete. Head long; snout short; no cirri; eyes placed high; mouth moderate, teeth in narrow bands on the jaws; palatine teeth present or absent; gill openings prolonged forward below, very narrowly united anteriorly to the isthmus, not forming a free fold across it. Dorsal composed of numerous, sharp, flexible, rather high spines; caudal fin long; anal many-rayed; pectorals large, more than one-half length of head, the middle rays longest; ventrals well developed, jugular I, 3 or I, 4; intestinal canal long; pyloric cæca present; no air bladder. Chiefly herbivorous. Northern seas.

(*Lumpen*, a Danish name of *Zoarces viviparus*, with which these fishes were at first confounded.)

a. LUMPENUS: Teeth on palatines, none on vomer.
  b. Dorsal spines about 70; eye not much shorter than snout; fins with dark cross bands .... *anguillaris*, 42.
  bb. Dorsal spines 75; eye much shorter than snout; fins all nearly plain. *fowleri*, 43.

42. LUMPENUS ANGUILLARIS (Pallas).

Blennius anguillaris PALLAS, Zoogr. Rosso-Asiat., II, 1811, p. 176; Kamchatka and Aleutian Islands.

Gunnellus anguillaris CUVIER and VALENCIENNES, Hist. Nat. Poiss., XI, 1836, p. 434.

Lumpenus anguillaris GIRARD, Pac. R. R. Surv., X, 1858, Fishes, p. 123, pl. XXV, figs. 1 to 3.—STORER, Synopsis, 1846, p. 121.—JORDAN and GILBERT, Synopsis, 1883, p. 777.—JORDAN and STARKS, Fishes Puget Sound, 1895, p. 848.—JORDAN and EVERMANN, Fishes N. and M. Amer., III, p. 2436.

Stichæus anguillaris GÜNTHER, Cat., III, 1861, p. 282.

Leptogunellus gracilis AYRES, Proc. Cal. Ac. Nat. Sci., I, 1855, p. 26; San Francisco.

Head 8; depth 14; D. LXXI; A. 46 (45–50); V. I, 4; B. 7.

Cheeks scaly; mouth somewhat oblique, the lower jaw included; maxillary reaching front of pupil; teeth on palatines, none on vomer; a single series of rather long, conical, and not very closely-set teeth in each jaw. Eye rather large, not much shorter than snout. Gill openings prolonged forward a distance greater than length of snout; pyloric cæca 4, unequal. Fins all comparatively high, pectorals two-thirds length of head, the middle rays longest; ventrals one-third length of head; dorsal and anal distinct from the pointed caudal, which is nearly as long as the head. Olive green above, pale below; sides marked above with dark olive brown; a series of more or less distinct oblong blotches of olive brown along middle of sides; dorsal barred or spotted and pale; opercle with a dark blotch; head dusky above. Length 18 inches. San Francisco to Alaska; very abundant northward to Sitka and Unalaska; originally recorded from Kamchatka. (Jordan and Evermann.)

A specimen in the museum at Hakodate from Tarumai near Mororan, probably belongs to this species. D. LXX; pectoral longer than head; ventrals 4 in head, equal to snout; maxillary 3¾ in head, reaching front of pupil.

(*anguillaris*, eel-like.)

43. LUMPENUS FOWLERI Jordan and Snyder, new species.

Stichæus islandicus ISHIKAWA, Prel. Cat., 1897, p. 35, No. 599; Nemuro. (Not of authors; an Iceland species.)

Head 7½ in length; depth 11; depth of caudal peduncle 4 in head; snout 4½; eye 7; interorbital space 15; D. LXXV; A. II, 47.

Eyes directed almost laterally, much smaller than length of snout. Maxillary extending to a vertical through anterior edge of pupil. Teeth in narrow bands on the jaws, the outer ones scarcely larger than the others; vomer without teeth; palatines with a small band of minute teeth. Gill-membranes narrowly united to the isthmus. Pseudobranchiæ large; gill-rakers on first arch about 2 + 10, short, pointed. Nostrils with low rims. No tentacles on the head.

Cheeks with scales, a broad band extending from mouth, backward and upward along cheek and side of head, uniting with scales of body; snout, top of head, chin, throat, opercle and space along preopercle naked; body covered with minute scales; membranes of dorsal and anal naked, membranes of caudal with minute scales between the rays.

Dorsal inserted immediately above gill-opening; spines strong, the anterior ones short, about equal to diameter of pupil, the posterior ones more slender, longer, $3\frac{1}{5}$ in head; membrane of dorsal thin, not connected with the caudal. Anal inserted below twenty-eighth spine of dorsal. The spines short, rather blunt, the rays longest on anterior third of fin, $2\frac{1}{5}$ in head; membrane of fin thin, with shallow incisions between the rays, not connected with the caudal. Caudal rounded, $1\frac{1}{2}$ in head. Pectoral sharply rounded, $1\frac{1}{5}$ in head. Spine of ventral stout, the fin small, pointed, 4 in head.

Color in spirits light yellowish brown, a dark brown band with irregular margins along base of dorsal, a broken band about as wide as pupil, forming a row of elongate brown spots extending from upper edge of gill-opening to base of caudal, small clouds of brown on upper half of body; top of head mottled with brown, cheeks with indistinct spots, opercles with a blackish spot, the membrane lining gill-chamber blackish. Fins without bands or spots, except a small, indistinct spot near base of caudal.

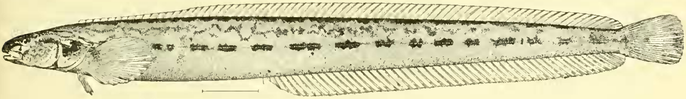

FIG. 28.—LUMPENUS FOWLERI.

Described from a specimen 315 mm. long, type 7079, Stanford ichthyological collections, from Kushiro; presented by Mr. Nozawa director of the museum of Sapporo.

The species differs notably from *Lumpenus anguillaris* in having a smaller eye, more spines in the dorsal, and in not having banded fins; the ventral is also probably shorter, being about equal to snout.

A specimen in the Imperial Museum (No. 599) from Nemuro probably belongs to this species. D. LXXVI; P. $1\frac{1}{4}$ in head; ventral not longer than snout; maxillary reaching to middle of eye. A specimen in the museum at Hakodate, also probably belonging to this species rather than to the preceding one, has 75 spines in the dorsal.

(Named for Mr. Henry Weed Fowler.)

Family II. ANARHICHADIDÆ.

WOLF-FISHES.

Body oblong or elongate, covered with rudimentary scales; no lateral line. Head scaleless, without cirri, its bones very thick and strong, the profile strongly decurved. Mouth very large, oblique, the jaws anteriorly with very strong conical canines; sides of lower jaw with very strong molar teeth, which shut against a series of very coarse molars on the palatines; vomer solid, armed with strong molar teeth, the dentition adapted for crushing sea-urchins and mollusks. Gill membranes broadly united to the isthmus; no pyloric cæca. Dorsal fin high, composed entirely of flexible spines; no ventral fins; pectoral fins broad, placed low. Large carniverous fishes of the northern seas.

ANARHICHADINÆ:

a. Body moderately elongate, the tail not tapering to a point; dorsal and anal separate from the caudal..*Anarhichas*, 28.

28. ANARHICHAS (Artedi) Linnæus.

Anarhichas (Artedi) Linnæus, Syst. Nat., 10th ed., 1758, p. 247 (*lupus*).

Body moderately elongate, covered with rudimentary scales; head scaleless, without cirri, compressed, narrowed above, the profile strongly decurved; mouth wide, oblique; premaxillary not protractile; jaws with very strong conical canines anteriorly; lateral teeth of lower jaw either molar or with pointed tubercles; upper jaw without lateral teeth; vomer extremely thick and solid, with 2 series of coarse molar teeth; palatines with 1 or 2 similar series. Gill-membranes broadly joined to the isthmus; no lateral line. Dorsal fin rather high, composed entirely of flexible spines, which are enveloped in the skin; anal fin lower; caudal fin developed, free from dorsal and anal; no ventral fins; pectoral fins broad, placed low; air-bladder present; no pyloric cæca. Northern seas. (*Anarhichas* or *Scansor*, the climber; an ancient name of *Anarhichas lupus;* from *ἀναρῥιχάομαι*, to climb or scramble up—the allusion not evident, the word spelled with a single *r* by Artedi and Linnæus.)

44. ANARHICHAS (species not described).

A large stuffed specimen of an *Anarhicas* is in the museum at Hakodate, from the Aino village of Mombetsu, province of Iburi, in Hokkaido. It is plain dark, with darker cross-bands; two rows of teeth on vomer and palatines. Head 5½ in length. Unfortunately our notes are not sufficient to distinguish this from the European species *Anarrhichas lupus* Linnæus, the only one with which it need be compared. It is to be hoped that some Japanese naturalist will complete the account of this interesting wolf-fish.

SUMMARY.

Family I. Blenniidæ.

1. *Tripterygion* Risso.

1. *etheostoma* Jordan and Snyder; Misaki, Wakanoura, Atami.
2. *bapturum* Jordan and Snyder; Misaki.

2. *Zacalles* Jordan and Snyder.

3. *bryope* Jordan and Snyder; Misaki, Wakanoura, Enoura.

3. *Blennius* Linnæus.

4. *yatabei* Jordan and Snyder; Misaki, Enoshima, Wakanoura.

4. *Petroscirtes* Rüppell.

5. *elatus* Jordan and Snyder; Ishigaki.

5. *Aspidontus* Cuvier.

6. *elegans* (Steindachner); Hakodate, Enoshima, Misaki, Wakanoura.
7. *trossulus* Jordan and Snyder; Misaki.
8. *dasson* Jordan and Snyder; Wakanoura, Agu.
9. *japonicus* Bleeker.

6. *Salarias* Cuvier.

10. *ceramensis* Bleeker; Ishigaki.

7. *Scartichthys* Jordan and Evermann.

11. *enosimæ* Jordan and Snyder; Enoshima, Yogashima, Misaki.
12. *stellifer* Jordan and Snyder; Wakanoura.

8. *Azuma* Jordan and Snyder.

13. *emmnion* Jordan and Snyder; Hakodate, Miyako.

9. *Bryostemma* Jordan and Starks.

14. *polyactocephalum* (Pallas).
15. *otohime* Jordan and Snyder; Hakodate.
16. *saitone* Jordan and Snyder; Aomori.

10. *Enedrias* Jordan and Gilbert.

17. *nebulosus* (Schlegel); Hakodate, Aomori, Otaru, Matsushima, Tokyo, Misaki, Onomichi.

11. *Pholis* Scopoli.

18. *pictus* (Kner); Stump.
19. *dolichogaster* (Pallas); Robben.
20. *taczanowskii* (Steindachner); Hakodate.
21. *fasciatus* (Bloch and Schneider); Aomori.

12. *Gunnellops* Bleeker.

22. *rosea* (Pallas).

13. *Alectrias* Jordan and Evermann.

23. *benjamini* (Jordan and Snyder); Hakodate.

14. *Eulophias* H. M. Smith.

24. *tanneri* H. M. Smith.

15. *Neozoarces* Steindachner.

25. *pulcher* Steindachner.
26. *steindachneri* Jordan and Snyder; Hakodate, Otaru.

16. *Zoarchias* Jordan and Snyder.

27. *veneficus* Jordan and Snyder; Mororan, Otaru, Hakodate.

17. *Dictyosoma* Schlegel.

28. *burgeri* Van der Hoeven; Aomori, Tokyo, Misaki, Wakanoura.

18. *Opisthocentrus* Kner.

29. *ocellatus* (Tilesius); Hakodate, Aomori, Mororan, Otaru.
30. *zonope* Jordan and Snyder; Mororan, Otaru.

19. *Abryois* Jordan and Snyder.

31. *azumæ* Jordan and Snyder; Mororan, Otaru.

20. *Pholidapus* Bean and Bean.

32. *dybowskii* (Steindachner); Iturup.
33. *grebnitzkii* Bean and Bean.

21. *Ernogrammus* Jordan and Evermann.

34. *hexagrammus* (Schlegel); Hakodate, Otaru.
35. *enneagrammus* Kner.
36. *epallax* Jordan and Snyder; Otaru.

22. *Ozorthe* Jordan and Evermann.

37. *dictyogrammus* (Herzenstein); Hakodate, Nemuro.

23. *Stichæopsis* Kner and Steindachner.

38. *nana* Kner and Steindachner.

24. *Stichæus* Reinhardt.

39. *nozawae* Jordan and Snyder; Otaru.

25. *Dinogunellus* Herzenstein.

40. *grigorjewi* (Herzenstein); Hakodate, Mito.

26. *Leptoclinus* Gill.

41. *maculatus* (Fries); Robben Island.

27. *Lumpenus* Reinhardt.

42. *anguillaris* (Pallas); Tarumai.
43. *fowleri* Jordan and Snyder; Kushiro, Nemuro, Hakodate.

Family II. ANARHICHADIDÆ.

28. *Anarhicas* Linnæus.

44. *species undetermined*; Mombetsu.